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TRUCKPORTATION AND TRUCK TIRES

WHILE the public imagination has been profoundly stirred by the wonderful development of the passenger automobile industry, the less spectacular production of motor trucks is just as remarkable. So valuable have motor trucks proved themselves that their manufacture rose from 25,375 in 1914 to 316,364 in 1919. Indeed, it is stated that the total registry of motor trucks in the United States for 1919 was 750,000, and that fully 600 auto truck transportation companies are now operating in the country. To the rubber industry this rapid and considerable expansion in the motor truck trade has direct and pecuniary interest. It means greatly increased tire production as the advantages of truckportation (to use a newly-coined and rather suitable term) become better appreciated.

It has been well said that never yet has a crisis loomed in our national history but that a great leader has always providentially appeared to meet and cope successfully with the impending difficulty. So, too, just as it was generally feared that our industrial establishments, reviving from the severe dislocation due to the Great War, would be acutely handicapped in the distribution of their products and perhaps forced to curtail their output at great loss to employers and employed because of the palpably inadequate service given by the railroads of the country, tire and motor truck manufacturers, by their alertness in providing supplemental transportation, actually averted an imminent peril to interurban and interstate commerce. Not only have they aided the seriously embarrassed railroads, but they have developed on a huge scale a new hauling business, a boon to all classes of producers and consumers.

That freight and express automobile service is here to stay, and that it is destined to have a far-reaching field of usefulness is forecasted in an article in this issue on "The Economics of Truckportation," in which the writer, with impressive statistics, deduces the conclusion that for comparatively short hauls (now averaging up to fifty miles, and which may soon be much more) the railroad cannot function as efficiently as the motor truck. For instance, while railroads would require 20 cents for terminal charges and 30 cents for delivery on 100 pounds carried fifty miles (apart from the freight rate), auto trucks collect, carry, and deliver the same weight of goods quite as swiftly, and with none of the rail line delays, over the same distance for a total of 50 cents, or an average of one cent per hundredweight for each mile. Indeed, a motor rate of $0.008 a mile on 100 pounds is quoted on a 100-mile run between New York and Philadelphia, in contrast with the $0.0115 rail express rate, with a 200-pound limit on packages.

While it is self-evident that the old rail freight and express lines will long continue immensely helpful, it requires no second sight to see that the lusty infant, "Truckportation," is bound to develop into a vigorous auxiliary, if not a powerful rival, of the old rail lines. Wasteful methods will be corrected by efficiency experts and rational cooperation encouraged among the carriers; legislation will be framed to standardize rates on a fair basis as in railroad practice; and measures will be taken to check destructive competition. As truckportation thus gains in stability it will attract even greater volume of trade and ample financial support for its expansion,—all of which also spells largely increased business for the rubber mills, which must provide tires for the mighty fleets of motor vans ceaselessly coursing the ever-improving commercial arteries of the nation.

RUBBER MEN AND COTTON

SECRETARY OF AGRICULTURE MEREDITH in a recent address predicted a great future for American Pima long-staple cotton grown on the irrigated deserts of southern California, Arizona and Mexico. This cotton, developed by careful breeding and selection, is regarded by the Secretary as the best in the world. Even during the war, as he pointed out, when it was discovered that the Germans had practically cornered the world's supply

of flax, an excellent substitute for linen was woven from it and with it nearly all American and a great number of Allied airplanes flew to victory.

The value of the Southwest long-staple crop last year was over $20,000,000. For this year the gross returns are estimated at fully $100,000,000. The industry is but eight years old, and so far has not had to contend with the boll-weevil, which for years has ravaged the cotton plantations along the Atlantic seaboard and the Gulf of Mexico. The development of this great planting industry is largely due to the foresight and enterprise of a number of the big manufacturers who financed planters, erected gins and themselves planted thousands of acres. If given a fair chance they would do the same in Cuba, in the Philippines, for example.

SOLVENT NAPHTHA FROM OIL SHALE

THE UNITED STATES is facing a crisis in its oil supply. Already we are importing petroleum. Nearly 40,000,000 barrels came from abroad during the fiscal year ended June 30, 1919, and these importations must increase year by year as we invent and build more machines which depend upon crude oil or its derivatives as fuel. Motor vehicles continue to multiply and so do ships, locomotives and factory power plants burning oil instead of coal. Industrial uses of gasoline, notably as the principal rubber solvent, call for larger quantities every year.

Geologists, engineers and economists are agreed that if a new demand for petroleum should develop, amounting to 100,000,000 barrels a year, it could not be met from domestic sources of supply. A permanent governmental petroleum administration to assist and participate in the commercial development of foreign and Philippine oils would be necessary. Already the limited supply and increasing demand, together with greater production costs, are being reflected in a rapidly increasing price, which is now more than double the pre-war average.

The situation calls for a prompt, determined national policy looking many years ahead. Either we must take positive steps to secure our share of the supply from the fields of the world, or else we must develop and use shale oil for all purposes to which it is adaptable—probably both.

Shale naphtha is an excellent solvent of rubber, having physical properties analogous to the solvent naphtha obtained from coal tar, of which more might well be used for spreading in America. While shale naphtha has found very little application in America, it is used extensively in Scotland and Germany for purposes where the odor does not matter, especially with asphaltum in certain insulating compounds. In America its wider application to various lines of rubber manufacture should help to meet a national emergency.

The time has come when the American supply of oil shale must be utilized. The position of the shale industry has changed materially in recent years with the advance in petroleum. At present prices it is possible for oil from shale to compete profitably with oil from wells. Crude oil can be produced from shale at $1.85 a barrel in Colorado and Utah. Crude petroleum oil is selling at $3.10 a barrel in Wyoming, while Pennsylvania oil is quoted at $6.10. The Scottish shale industry has been profitable for many years, and its record should be bettered in this country because of the greater richness of shale strata and their more easily workable surface location.

President Alderson, of the Colorado School of Mines, states that the American oil shale supply is practically unlimited. He points to the fact that the petroleum production from wells in this country to date has been obtained from 4,109 square miles with an estimated yield of 2,280,000 barrels per square mile, and asserts that one ten-foot seam of shale, yielding one barrel of oil per ton, will give 15,488,000 barrels of oil, or seven times the square mile output from wells. The 5,500 square miles of oil shale in Colorado and Utah will produce 255,000,000,000 barrels.

An oil shale refining plant can be put in successful operation for an investment of $500,000 on which there would be a substantial return. Some of the large and progressive rubber companies are producing their own crude rubber and long-staple cotton. Why not their solvents also?

AVOIDANCE OF BUSINESS LAWSUITS IN FAVOR OF arbitration is urged on local business men by the Chicago Association of Commerce. The association has arranged for commercial arbitration under the State law and has designated a committee to promote it.

Commercial arbitration combines an ideal method of determining questions of fact with a standard procedure for deciding points of law. It does not involve any surrender or impairment of legal rights, but provides for the determination of facts before an arbitrator having ample power and confidence, and if points of law arise in the evidence these alone are submitted to a court. That necessity seldom arises.

PURCHASING AGENTS IN BUYING RUBBER GOODS AT first are prone to outline minutely the kind and percentage of rubber, the character and quantity of compounding ingredients, and even the time of cure. In time they learn that the use of hard and fast specification is the exception rather than the rule, a much safer guide being found in the representations of reliable rubber manufacturers. This is because compounds and processes vary widely, so that a buyer's carefully detailed specifications of today may be much out of date tomorrow. Moreover, research workers and experts are bringing about daily changes in the rubber industry, that result not merely in increased production but in decided betterment in the quality of the output.

The Economics of Truckportation

By Richard Hoadley Tingley

The advent of the motor truck to the business of transporting freight and express matter in competition with such old-time carriers as the railroads and express companies isn't expected to bankrupt the business of either, nor is it expected to embarrass them in any way. The rapid manner in which the country's growth exceeds every system of transportation almost as soon as inaugurated, and the congestion one meets with on all hands where transportation of any kind figures, clearly indicates that there is a field of service for all—that the motor truck has its own well-defined sphere of usefulness, and that, instead of being a competitor to the older-established methods of transportation, it is a feeder to them—an adjunct to their business. This fact is emphasized by the present predicament of the railroads with a shortage amounting to three-quarters of a million freight cars, and a locomotive efficiency of scarcely more than fifty per cent of normal quota. Add to this the woeful lack of terminal facilities at all points and it will be evident that the rail carriers should welcome any relief that will enable them to properly function in their field.

RAIL FREIGHT RATES NEED ADJUSTING FOR COMPARATIVE PURPOSES

It is the short haul business that puzzles the railroads, particularly when moving in less than car lots. It is generally conceded that this class of business is unprofitable to handle. It has been considered by railroad operators for years that there was no money in freight haulage until a distance of forty miles had been covered. Today, the modern generation of operators place the limit at double that distance.

It will be seen, then, that the motor truck in the handling of freights—"Truckportation," as the new business is called—should not interfere with the business of the rail carriers even though operating in parallel lines, for the average truck line is less than eighty miles, although many now doing a good business operate over much greater distances.

Let us take the case of a wholesale merchant in a large city shipping goods by freight to a retail merchant in a town, say, fifty miles away. From the best figures I am able to obtain, the terminal charges of such a shipment amount to ten cents per one hundred pounds at each end. These charges include switching and placing the car, loading and unloading, and clerical work. The twenty cents does not cover the rail haul. The average charge per hundredweight for truck delivery at each end is approximately fifteen cents. It will be seen therefore that a cost to the shipper of fifty cents is reached, which is exclusive of the line haul charge made by the railway company, and that a truckportation company that can make money at fifty cents per hundredweight on a fifty-mile haul is in a fair way to get business. This rate figures out just a cent a hundredweight a mile. An added advantage to the truck man, also, is that his delivery is made within a few hours, or over night, while it may take freight in less-than-car lots days and often weeks to reach its destination.

In competition with the railway express, some of the same conditions obtain, though the disparity of the comparison is much less marked. Being dependent upon railway service and upon railway cars for a portion of its usefulness, delays are sure to creep in to such service that will not be applicable in the case of merchandise hauled all the way by truck. But the express business of the country is now, practically, in the hands of one organization, the American Railway Express Company, to which I shall refer later.

It would not be fair to truckportation as a business to compare its rates of charge for service with either rail freight or express rates without taking into account many modifying factors. In the first place the freight trucking business is so new that it has not yet found itself. There is little cooperation among the carriers of such freight, although the National Automobile Chamber of Commerce, through the secretary of the Motor Truck Committee, F. W. Fenn, is working hard to bring order and standardization into the ranks. Although occupying the public highways in the conduct of their business, these companies have been brought under the supervision of state or municipal regulation in but a few instances. Nebraska is the only state, so far as I am now informed, where the Public Service Commission has taken a hand in the regulation of rates of charges for such service. There are other states which, I believe, are soon to follow. Each truckportation company charges a rate it sees fit, always higher on a straight comparative basis than the rail freight between given points, and often somewhat lower than the rail express rate; often higher, too, for, with the prompt delivery guaranteed as against an often uncertain delivery of the railway express, it is considered that a charge for a "super-service" is reasonable. Motor truck companies claim that shippers want service first and are willing to pay for it, even at a slight advance over something less dependable.

Pneumatic Tired Motor Trucks with Double-Deck Bodies, Operated by the Interurban Motor Express Out of Sioux City, Iowa, Through Western Iowa and Eastern Nebraska, Have Made an Enviable Record in the Haulage of Livestock. They Serve 150 Farms, Hauling Their Product to the Stockyards and Bringing Back Goods from the City

It has often been stated that the charges for truckportation service amounts, on an average, to a cent a hundredweight a mile. This, although true in some cases, is but a figure of speech, even as an average, as will be seen.

NEW YORK-PHILADELPHIA RATES

Take the case of the American Motor Freight Corporation operating a through daily over-night express service with twenty-two or more trucks between New York and Philadelphia. The distance travelled is almost exactly 100 miles by the highways and its schedule of charges is as follows:

1 to 25 pounds	$0.50
25 to 50 pounds	0.70
50 to 75 pounds	0.90
75 to 100 pounds	1.00 per hundred
100 to 2,000 pounds	0.90 per hundred
4,000 to 8,000 pounds	0.85 per hundred
8,000 to 10,000 pounds	0.80 per hundred

From this it will be seen that for merchandise weighing from seventy-five to one hundred pounds the rate of charge is exactly a cent ($0.01) a mile a hundred pounds, but for a consignment weighing 2,000 pounds the rate figures but nine-tenths of a cent, ($.009) a hundred pounds a mile, and a consignment weighing 10,000 pounds (a full load) would cost $80, or eight-tenths of a cent, ($0.008) per 100 pounds per mile.

Placed in contrast with the first-class railway freight service between these points, the rate, as of March 1, 1920, was 33 cents per 100 pounds, which was increased by the recent rulings of the Interstate Commerce Commission to 46 cents, (or $0.0046) per 100 pounds per mile, assuming the same distance is travelled by the railway freight car as by the motor truck.

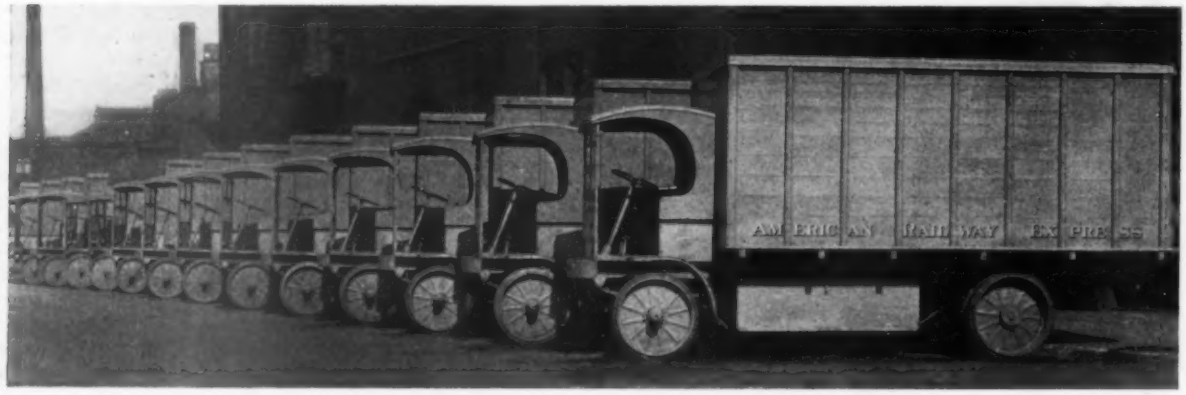
Again, by comparison with a similar service by the American Railway Express Company, the first-class express rate was raised from ninety cents per hundredweight to $1.15 by order of the Interstate Commerce Commission, which amounts to $0.0115 per 100 pounds per mile, which practically equals the conventional average quoted for truck service. It must be remembered, however, that there is pending before the Interstate Commerce Commission an application by the American Railway Express Company for an additional increase in rates which may, indeed, be granted before this article is published. In that event the disparity in rates will be still more marked.

Owing to the general shortage in railway equipment and congestion at terminals, the American Railway Express is now declining to accept matter weighing more than 200 pounds per package. This, however, is considered as a temporary measure only but, since the motor truck companies are prepared to accept shipments up to two tons, it gives them, for the present at least, an advantage they are not slow to follow up.

A friend of mine has recently contracted with a truckportation company to move his household furniture from New York to Boston. The rate quoted is 75 cents a 100 pounds, and, as the distance to Boston is practically 250 miles, the rate per 100 pounds per mile is three-tenths of a cent ($0.003).

BAUHAM'S RATE COMPARISONS

In calculating the comparative cost of a shipment of merchandise by one method or another, it is proper to take into consideration all items of expense involved in the delivery of the goods from the door of the consignor to that of the consignee. If, by one method of transportation, additional expense is made necessary by boxing or crating requirements, this should be taken into consideration. If, by such boxing or crating, additional weight is given to the consignment, this, also, should be noted. W. J. L. Bauham, traffic manager of the Otis Elevator Co., has made some interesting studies of rate comparisons, on merchandise moving by rail freight and by motor truck, after taking these items into account. I shall quote some of his findings in substance. He includes in the freight cost the first-class rate, plus fifteen cents per 100 pounds teaming charges from shipper's warehouse to freight house, plus fifteen cents per 100 pounds against teaming charges from freight house to receiver's warehouse, plus 24 cents per 100 pounds increased cost of boxing to cover shipment made via rail freight, plus 17 cents per 100 pounds increased weight caused by increased boxing. The rate via motor truck he figures out covers delivery from shipper's warehouse to receiver's warehouse; and he tabulates his results as follows:



The American Railway Express Company Uses Many Electric Trucks on Solid Tires for Short Urban Business

Rate Comparisons—Per 100 Pounds

From New York, to—	Rail Freight	Motor Truck
Newark, New Jersey	$0.91	$0.15
Paterson, New Jersey	0.91	0.20
New Brunswick, New Jersey	0.91	0.40
Trenton, New Jersey	0.98	0.60
Philadelphia, Pennsylvania	1.02	0.80
Wilmington, Delaware	1.13	1.20
Bridgeport, Connecticut	1.10	0.70
New Haven, Connecticut	1.13	0.73
Waterbury, Connecticut	1.16	0.75
Hartford, Connecticut	1.21	0.90
Springfield, Massachusetts	1.25	1.00
Worcester, Massachusetts	1.31	1.50
Providence, Rhode Island	1.32	1.10
Boston, Massachusetts	1.36	1.50

It will be noted from the above that the motor rate between New York and Boston is double that which I previously quoted in the case of transporting household furniture. It will be further noted that the motor rate between New York and sev-

eral of the points mentioned, as to Newark, Paterson, New Haven, etc., practically amounts to the conventional and oft-quoted average of a cent a hundredweight a mile, while the rate to Providence is little more than a half this theoretical figure.

MOTOR FREIGHT RATES IN MINNESOTA

The Rural Motor Truck Terminals, Inc., of Minneapolis, whose motto is "Safe Speed Service with Every Shipment Insured," operates seventeen lines out of that city and St. Paul in all directions. Its published schedule throws some light on motor freight rates in the Middle West.

RURAL MOTOR TRUCK TERMINALS, INC.

Distance from Minneapolis, Miles	1 to 500 lbs. First Class	501 to 1,500 lbs. Second Class	Over 1,501 lbs. Third Class
1 to 15	$0.34	$0.29	$0.24
16 to 20	.40	.34	.28
21 to 25	.46	.39	.32
26 to 30	.53	.45	.37
31 to 35	.59	.50	.41
36 to 40	.65	.55	.46
41 to 45	.71	.61	.50
46 to 50	.78	.66	.55
51 to 55	.84	.72	.59
56 to 60	.90	.73	.63
61 to 65	.96	.82	.67
66 to 70	1.03	.88	.72
71 to 75	1.09	.93	.77
76 to 80	1.15	.98	.81
81 to 85	1.21	1.03	.85
86 to 90	1.28	1.09	.90
91 to 95	1.34	1.14	.94
96 to 125	1.40	1.19	.98
126 to 130	1.45	1.23	1.02
131 to 135	1.50	1.28	1.05
136 to 140	1.55	1.32	1.09
141 to 145	1.60	1.36	1.12
146 to 150	1.65	1.40	1.16
151 to 171	1.86	1.58	1.30

It will be noted from these schedules that for first-class shipments of 1 to 500 pounds the rate per hundred miles of haul amounts to one and four-tenths of a cent a mile ($0.014), for second-class $0.012, and for third class $0.0098.

SOME IOWA MOTOR TRUCKPORTATION RATES

The Interurban Motor Express Company operates a daily service over five routes out of Sioux City, Iowa, to small towns in that state and publishes a schedule of freight rates in four classes in which merchandise is rated according to the Official Western Classification: The figures below represent rates in cents per 100 pounds, for classes 1, 2, 3 and 4:

From Sioux City to—	Miles	1	2	3	4
James City	6	30	28	23	20
Henton	11	30	28	23	20
Merrill	18	30	28	23	20
Lemars	25	30	28	23	20
Lawton	11	30	28	23	20
Moville	17	30	28	23	20
Kingsley	27	30	28	23	20
Bronson	11	30	28	23	20
Clumbing Hill	15	30	28	23	20
Holly Springs	16	30	28	23	20
Horlick	26	30	28	23	20
Sargent's Bluff	8	30	28	23	20
Salix	16	30	28	23	20
Sloan	21	30	28	23	20
Neptune	20	35	30	28	23
O'Leary	24	37	32	29	24

I have reproduced this schedule as a whole in order to illustrate the fact that rates of charge by truckportation companies do not always follow the mileage basis. This company makes the same charge for hauling 100 pounds 6 miles to James City as to Kingsley, which is 27 miles away. But for some reason not known, perhaps owing to highway conditions, its charges are increased on all classes of goods for hauling the 20 and 24 miles to Neptune and O'Leary. Taking the first-class rate from Sioux City to James City, 6 miles, the rate per 100 pounds per mile is five cents, while the 100-pound mile rate to Kingsley, 27 miles, is 1.11 cents. The Iowa company makes special rates on cream, eggs and live stock which I will not quote. Its minimum charge for any shipment is 50 cents, which rule is generally adopted by all truckportation companies.

THE NEBRASKA RAILROAD COMMISSION FIXES MOTOR RATES

On the other hand, the Nebraska State Railway Commission, the only state that has so far prescribed rates of charge that motor freight companies shall use, has followed strict railroad practice and adhered closely to the graduated mileage basis. Its published schedules cover from one to 150 miles of haul, taking the four classifications into account. Its rate on first-class matter carries an initial charge of 20 cents, plus one and one-half cents a mile for second-class, 85 per cent of the first-class rate. Taking the first-class rate on a 25-mile haul, this amounts to 57½ cents per 100 pounds, or 2.3 cents a mile; for a 100-mile haul, $1.70, or 1.7 cents, and for a 150-mile haul, $2.45, or 1.64 cents a hundredweight a mile.

TRUCK COMPANIES THE COUNTRY OVER

It is stated by some authorities that there are 600 different truckportation companies now in operation as common carriers. It is impossible, however, to accurately estimate their number. Statistics of this kind are difficult to obtain and the business is growing so rapidly that they would be worthless in a short time if available. We do know, however, that there were 316,364 commercial trucks manufactured in the United States in 1919, as against 25,375 in 1914 and that there were 750,000 such vehicles registered in this country last year. There are twenty different motor freight lines running out of Baltimore and Washington to nearby and distant Maryland towns covering 500 miles of highways and making a daily average of 1,500 miles. California is said to have 150 separate lines. There are no less than 138 trucking companies doing business in and around New York, if the advertisements in the motor magazines may be credited. In ten months, motor trucks carried from Council Bluffs to Omaha 18,498 head of cattle, 158,019 hogs and 37,130 sheep. In Cincinnati, much the same thing is happening. A line from Adrian to Detroit carries everything from butter to buttons and from castings to calves. There are lines all over Ohio, Missouri and Kansas. A trucking company that operates from Deadwood, South Dakota to Sundance, Wyoming, 45 miles, makes delivery of goods in six hours, where it is claimed the railroads take four or five days. From Chattanooga, Tennessee, to Atlanta, Georgia, is a long haul, but the motor truck is doing it regularly, serving the farming communities on the way.

Perhaps the best-known people in long-distance trucking is The Goodyear Tire & Rubber Co., Akron, Ohio. This company has five trucks that operate between Akron and Boston. The distance is figured at 1,500 miles and the round trip is made in five and a half days. It also operates six 3½ to 5-ton trucks between Akron and Cleveland. The Goodyear company, however, does not operate as a common carrier but confines itself to transporting its own finished products to the Eastern markets, returning with raw materials and supplies.

LOOKING AHEAD

What is the future of truckportation? It is more than evident that, as an adjunct and feeder to the railroad, it has a distinct field of operation. In paralleling a railroad for short hauls it can, no doubt, successfully compete with it even at much higher rates of charge because its service is so markedly superior. What will happen at some future time when the railroads have emerged from the difficulties and embarrassments that have so

long hampered their activities and are once more on a properly functioning basis, is a matter that time only can decide. It is fair to presume, however, that, in the meantime, the business of truckportation will have become a recognized, standardized institution, fulfilling a field of usefulness from which it will be difficult to dislodge it.

THE AMERICAN RAILWAY EXPRESS COMPANY IN TRUCKPORTATION

The status of truckportation with respect to the American Railway Express is a different matter. This company, by reason of the forced consolidation of all the express companies of the country into its one organization in 1918, operates on every railroad in the country. It handles a million shipments a day. It has a working force of 135,000 people. It is equipped to do a big business, and it is going to do it, truckportation or no. It has fleets upon fleets of motor trucks of its own operation at terminals for delivery of goods to its express cars.

Competing with itself, and in order to try out the possibilities of all motor express transportation, the American Railway Express Company has been experimenting with a line of its own between New York and Passaic and Paterson, New Jersey, respectively 16 and 22 miles away. A fleet of 10 new 3½-ton trucks with "Van" bodies was assigned to this service; and, when operations have been conducted for a sufficiently long period this organization will know something about truckportation, its costs and its usefulness.

ELASTIC CORD FOR AIRPLANE SHOCK ABSORBERS

ANYONE who has experienced the thrill of landing in an airplane recalls the swift upward rush of the earth to meet the craft and the disproportionately slight shock of the actual contact of earth and plane. One invariably feels braced for a more racking shock and the absence of jolting is a matter of wonder. Almost the first conclusion reached about the science of aviation was that the safety of an aviator depends in great measure on the landing. This fact was unscientifically stated long ago by the small boy who observed that falling did not hurt him but it hurt when he stopped, and in order that Uncle Sam's aviators shall not be hurt when they "stop," much careful study has been given by manufacturers of aircraft to the problem of lessening the shock of landing. The result has been the rubber shock absorbers with which the landing wheels of all Government airplanes are now fitted. Ordinary automobile springs and shock absorbers were out of the question because of their weight, and an ingenious contrivance utilizing rubber cord was used instead.

AIRPLANE EQUIPPED WITH RUBBER SHOCK ABSORBERS

It is due to the remarkable quality of india rubber that specially constructed elastic cords are successful in heavy airplane construction to secure the cushioning effect when landing. The wheel supports, at both front and rear of the machine, are provided with steel tubes that slide within each other. The rubber cords supply the necessary tension to the sliding supports, so that when the machine is on the ground the weight is cushioned by the tension of the rubber cords, and when flying they are relaxed. Sixteen of these cords to a machine are generally used, but that depends, however, on the weight and style of the airplane.

Great care is given to the quality of the rubber cords used in shock absorbers on all government planes. The rubber used is a compound containing at least 90 per cent by weight of the best quality wild or plantation rubber. This gives a very "lively" compound, which is also free from ingredients known as "oil substitute." The organic acetone extract does not exceed 3½ per cent of the weight of the rubber and the free sulphur content does not exceed one-half per cent of the total compound. The weight of the non-volatile ash does not exceed 5 per cent of the compound.

The elastic cord varies in width according to its use, but the appearance and construction are the same for all sizes. It is composed of multiple strands of rubber tightly encased within two layers of cotton braid. The rubber strands are square, of equal size (0.05—0.035-inch), and are thoroughly treated with soapstone or talc to prevent them from adhering to each other in the finished cord. The number of strands varies according to the diameter specified, which always means the over-all diameter of the braid with rubber strands enclosed. A tolerance of plus ¼-inch is allowed in the over-all diameter but there must be no minus variation. The double covering of braid is very strong, each thread of it having a tensile strength of from 4 to 5¼ pounds by test. Both the inner and outer braids are wrapped over and under with three or four threads.

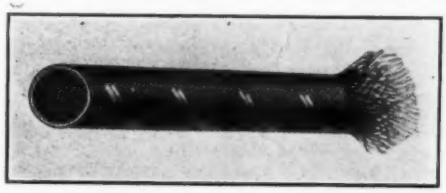
In consequence of the care used in material and manufacture an elastic cord of great durability and tensile strength is produced, which is well fitted to endure the strain of use in airplane shock absorbers. Two inches of the rubber cord used by the Government will stretch to 16 inches before breaking, over 700 per cent extension. After aging in dry heat for seven days at a temperature of 160 degrees F., a two-inch specimen will still stretch to 9 inches, an extension of 350 per cent.

In order to test its fitness a 6-inch sample of cord is stretched to double its normal length and the weight of the load measured. To give this 100 per cent extension in a cord of ½-inch diameter a load of from 145 to 180 pounds should be required. If the

cord cannot stand the minimum pull it is not fit for Uncle Sam's use.

In order to test the cord thoroughly, samples are cut from each 500 feet of the product unless the inspector judges that the uniformity of the cord can be ascertained with fewer samples.

As almost all resilient material deteriorates with age, great care is taken to use new elastic cord, no cord being used if more than



Elastic Cord for Airplanes

six months from the factory. To eliminate any old material, each factory making elastic cord for Government airplanes is required to use an identification system by means of two colored threads woven in the entire length of the cord. These colors are designated by the Government for use in a specified period. For instance, all elastic cord woven for the Government in January, February, and March, 1920, contained threads of black and maroon in its outer covering.

In addition to this color system each roll of finished cord is plainly marked with the date of manufacture on a tag of permanent nature fixed to the cord.

The Air Service reserves the right of free access to all parts of the plants in which elastic cord is manufactured for the Government, and also the right to inspect all materials entering into its construction.

We are indebted for the information used in this article to the Specifications and Standards Section, Engineering Division, Air Service, United States Army, Dayton, Ohio.

MEETING OF THE RUBBER DIVISION OF THE AMERICAN CHEMICAL SOCIETY

At the recent Chicago convention of the American Chemical Society, held September 7-10, the Rubber Division had a most interesting meeting. The various divisional meetings convened at the University of Chicago and were very well attended, attendance varying between 75 and 100. The following is an outline of the proceedings.

ACCELERATORS

Concerning accelerators, the secretary reported that following the discussion at the spring meeting in St. Louis he had given the announcement to the trade journals that the division did not object to the proper use of trade names for accelerators, but that it did most strenuously object to the marketing of unknown products which are sold under trade names and whose true constituents are supposed to be kept secret. This objection is twofold; the Division believes that the advancement of the industry is retarded by the use of unknown materials and that the public often suffers by the indiscreet use of unknown accelerators.

Discussion followed as to the best means of ridding the market of vague accelerators, and a committee was appointed consisting of J. B. Tuttle, W. F. Zimmerli, C. W. Bedford and A. H. Smith to index all available information concerning the analysis of accelerators on the market and to keep this file complete as new accelerators appear. The information in this file will be available to members of the Division.

PHYSICAL TESTING

Professor H. E. Simmons reported that the committee on physical testing was endeavoring to obtain specifications for the physical testing of rubber which would be satisfactory to all of the various interested societies and organizations.

Two papers were read by Mr. De Pew, presented by the research laboratories of the New Jersey Zinc Co. The abstracts follow:

The Aging of Some Rubber Compounds.—Comparative results on accelerated aging tests on zinc oxide stocks as compared with some carbon black stocks. Considerable checking and cracking was observed on the surface of the stocks, the zinc oxide stock showing up by far the more favorable of the two. It was pointed out by Mr. North that the high percentage of hexamethylene tetramine would cause very bad aging and might be held accountable for some of the bad aging of the black stock.

Some Micro-Sections Cut From Vulcanized Rubber Articles.—Mr. De Pew gave a very interesting description of the difficulties encountered in making microphotographs of rubber articles and told of the methods with which they had been most successful. He had prepared slides from a good many sections, which proved quite instructive on the screen.

PEACHEY'S VULCANIZATION PROCESS

The round table discussion largely concerned the method of vulcanization recently proposed by Mr. Peachey. Samples were shown of various types of rubber goods vulcanized by the new process. The discussion brought out the following points:

Scientifically the method is correct; the action of hydrogen-sulphide and sulphur dioxide in the rubber reacting to produce active sulphur, which in turn vulcanizes the rubber almost instantaneously at ordinary temperatures. This vulcanization permits the use in rubber goods of many dyes which will not stand the present conditions of manufacture.

The reaction between hydrogen sulphide and sulphur dioxide does not produce all active sulphur, however, a considerable portion of sulphur *mu* being formed. Extraction of goods cured by this process will often show more uncombined than combined sulphur and the free sulphur content is usually as high as in goods cured in the ordinary way.

The practical operation of the method is the insurmountable difficulty of the process. The degree of vulcanization must be regulated by a very careful measure of the quantity of gases absorbed, the production of a uniform state of vulcanization through an article of appreciable thickness being impossible.

Because of the impossibility of obtaining a uniform state of vulcanization and of the difficulty of controlling the quantity of the different gases, American chemists have not grown enthusiastic over the process as have their English brothers.

RUBBER ENERGY

W. B. Wiegand brought out many interesting facts concerning the resultant energy storage capacity of rubber compounds, their hysteresis losses and other physical properties due to the introduction of different fillers into the compound. The particle sizes of ordinary compounding ingredients were shown by slides and the properties they impart to rubber were shown by stress-strain curves.

The quality of the tire which enables it to stand the rough usage of thousands of miles of travel, as Dr. Wiegand outlined, is due to the fact that well-vulcanized rubber has several hundred times greater energy storage capacity than any other structural material. This property renders it of the greatest value in the absorption of the shocks of the main traveled road. Its energy can be changed into frictional heat, and it can also be increased by adding to it certain substances.

"In a pneumatic tire," said Dr. Wiegand, "the most important energy losses are those due to fabric chafing. For the measurement of these and also for the analysis of the casing from the standpoint of determining the effect of various physical changes upon the substance, the tire pendulum is described. It shows that the lessening of energy by the complete tread and breaker of a pneumatic tire is no greater than that caused by a single ply

of carcass fabric. The tire pendulum also shows that cord fabric is three times as efficient as square woven fabric from the standpoint of energy dissipation."

Dr. Wiegand maintained that energy storage capacity was the only accurate measure of the ability of a tire to withstand the grinding wear of the highway. He told of the effect of various pigments used in the coloring of the rubber, and classified them as active, or inert, in accordance with their influence in increasing or decreasing the total energy capacity of the compounds employed.

The speaker also made brief reference to the probable special arrangement of ingredients, when added in various proportions to the elastic gum.

SYMPOSIUM ON RUBBER ANALYSIS

The symposium on rubber analysis was primarily intended to review the work that has been done and to correlate it with any work that might be attempted by the Division. W. W. Evans has prepared a compilation of the literature on rubber analysis which is undoubtedly as complete as anything published. Not only are the references given but comprehensive abstracts are included. The members of the Division received these before the meeting so that they could be reviewed.

Discussion on various determinations was led largely by men who have been active in developing or improving these methods. The various direct methods for the determination of rubber were discussed and also the methods for the determination of the various extracts, free and total sulphur, fillers, etc. The point was brought out very clearly that since compounded rubber goods contain almost anything, the production of a uniform procedure for the analysis of all goods was out of question. After all, the important part of rubber analysis is not to get the analytical results, but to interpret properly the figures obtained, taking into consideration the methods that were employed. The division decided that for the present no work on analysis should be undertaken by the Division.

RUBBER DIVISION OFFICERS

The election of officers for the coming year resulted as follows: W. W. Evans, chairman; C. W. Sanderson, vice chairman; Arnold H. Smith, secretary, the Research Laboratory, Goodyear Tire & Rubber Co., Akron, Ohio.

Executive Committee—G. D. Kratz, J. B. Tuttle, C. W. Bedford, J. R. MacGregor and H. E. Simmons.

ABSTRACTS OF PAPERS READ AT THE MEETING

A Theory of Vulcanization Based on the Formation of Polysulphides During Vulcanization

All organic accelerators and a number of inorganic accelerators function as catalysts of vulcanization through the formation of polysulphides. These accelerators may be placed in two classes:

1. Hydrogen sulphide polysulphide accelerators.
   Organic bases are believed to form polysulphides by the aid of hydrogen sulphide. Examples are piperidene and dimethylamine, which form polysulphides in the presence of hydrogen sulphide and sulphur. Inorganic bases such as sodium hydroxide, calcium hydrate, magnesium oxide and basic magnesium carbonate function in the same manner as the above.
2. Carbo-sulph-hydrol polysulphide accelerators.
   Thioureas and dithiocarbamates are believed to form some type of polysulphides through the grouping C-SH.

Differentiated from the above two classes of accelerators are such accelerators as zinc oxide and litharge, which do not form polysulphides. These are termed "secondary accelerators" owing to the fact that they decompose polysulphides to give active sulphur.—Winfield Scott and C. W. Bedford.

The Action of Heat and Light on Vulcanized Rubber

The action of heat and light on vulcanized rubber is frequently spoken of as being identical, and oxidation is said to be the cause of the deterioration. From published and unpublished tests it is shown that the action of heat is one of change in the rate of the chemical reaction between rubber and sulphur and goes on throughout the entire mass, whereas the action of light is one of oxidation, taking place on the surface. Heat produces no change in the solubility of the rubber substance in solvents such as acetone and alcohol, whereas light breaks up the rubber molecule, forming decomposition products which are readily soluble in acetone.—J. B. Tuttle.

The Action of Certain Organic Accelerators in the Vulcanization of Rubber (II)[1]

The activities of certain synthetic, nitrogenous organic accelerators, in a mixture of rubber and sulphur, were compared with the dissociation constants of the original substances. With the exception of members of a closely related series, no definite relation was found to exist between the activities of the substances as accelerators and their dissociation constants. Substances which decompose or react with other components of the mixture to form substances of acid character do not accelerate unless a neutralizing base or salt is present. The results obtained and the conclusions drawn from them compare favorably with other results obtained with ammonium salts.—G. D. Kratz, A. H. Flower and B. J. Shapiro.

The Action of Certain Organic Accelerators in the Vulcanization of Rubber (III)[1]

The relative activities of molecularly equivalent amounts of aniline and diphenylthiourea in the acceleration of vulcanization were compared in rubber-sulphur mixtures and in mixtures which contained zinc oxide. In a rubber-sulphur mixture, the activity of aniline was found to be much greater than that of diphenylthiourea. In mixtures which contained zinc oxide, the reverse was true. With aniline as the accelerator, either in the presence or absence of zinc oxide, the same maximum tensile strength was obtained, accompanied by a higher sulphur coefficient in the absence of zinc oxide than when this substance was present. The mixture which contained zinc oxide attained the same maximum tensile strengths at approximately the same sulphur coefficients, irrespective of whether aniline or diphenylthiourea was employed as the accelerator. It is evident that there is apparently no general relation between the physical properties and sulphur coefficients of accelerated mixtures.—G. D. Kratz, A. H. Flower and B. J. Shapiro.

The Organization of an Information Service in Connection With Industrial Research Organizations

The expansion of industrial research justifies a study of its organization and its relation to the parent corporation. It is developed that about 2 per cent of the total turnover of a corporation may profitably be spent for development, and that about 2 per cent of this development fund may be applied to information service.

This department should have as large a library as is justified, and, through weekly bulletins and monographs, should keep the workers informed of the progress of knowledge as developed in the literature and from experimental work. All the information available should be indexed in such a way that it may be readily searched. It seems desirable that this department should edit technical reports, in order that the relation between new work and old may be brought out. This department should be able to prepare reports which are intelligible to business executives.

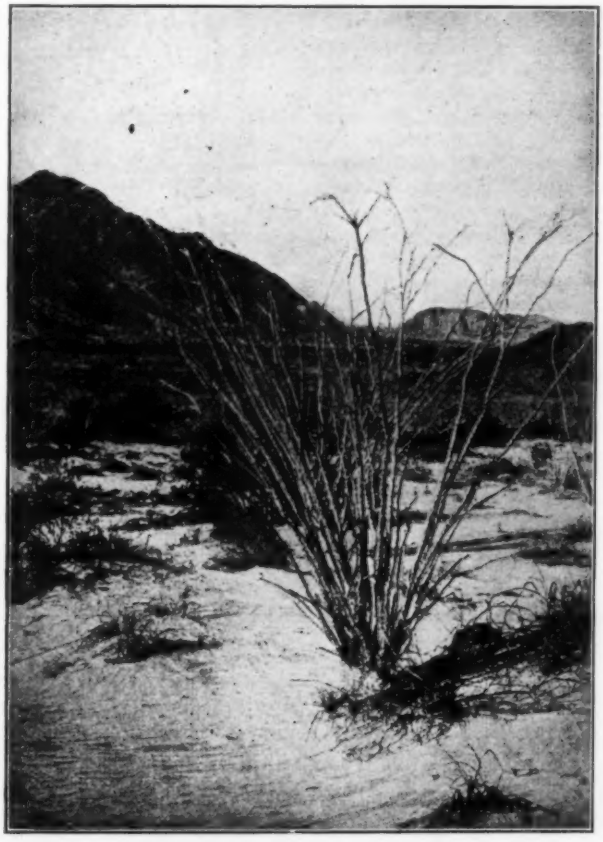
The technical details of the establishment and operation of such a division are discussed.—R. P. Rose and J. H. Reel.

[1] Part I, see The India Rubber World, October 1, 1919, page 21. See also The India Rubber World, June 1, 1919, pages 485-6.

Ocotillo Again to the Front

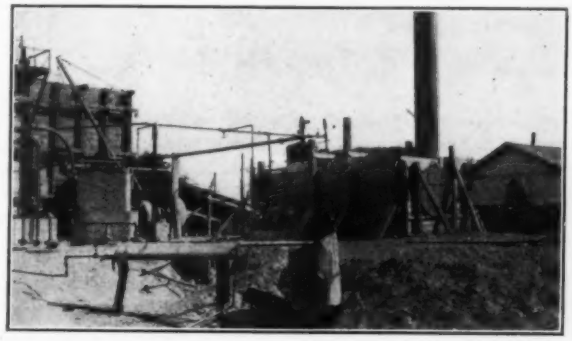
In November, 1916, The India Rubber World chronicled the experimental work being done in extracting gum from ocotillo in Arizona. The first work was not apparently successful but that success is now assured is the assertion of Daniel M. Bechtel, president of the Ocotillo Products Co., of Indianapolis, which has just completed a large addition to its works at Salome, Yuma County, Arizona. The plant was started several years ago in an experimental way to obtain a chicle-like gum from the ocotillo to use in a waterproofing compound. A process of gasoline solvent-distillation was first employed for recovering the gum from the bark of the plant, but this method left in the gum so much resinous substance that a perfectly satisfactory cure could not be effected. So, too, the process was rather crude and wasteful; and, discouraged by the small output and the relatively inferior product, the projectors were often tempted to quit.

At the outbreak of the World War, however, Dr. E. Cornelius Weisgerber, a noted chemist, who had been put in charge of the research and development division of the United States Army and Navy, and who helped to originate valuable "smoke screen," explosive, and pyrotechnic preparations, was directed



The Ocotillo in Its Desert Home

to prepare a waterproof composition for painting concrete ships, for coating concrete piling, and for lining the insides of hand grenades. His attention was attracted to the possibilities of ocotillo gum; and, taking up the earlier and incomplete experiments at the desert works, he discarded the solvent-recovery process and substituted that of destructive-distillation with sub-



Factory of the Ocotillo Products Co., Salome, Arizona

sequent refinements. The result was the production of a rubber-cellulose base preparation, which, after being sprayed on dry concrete not only stopped all seepage but also overcame one of the worst troubles of concrete ship builders, electrolytic decomposition of the steel reinforcing. Concrete piling was coated on the part most liable to disintegration, between high and low water mark, and after a two years' test government experts declared that neither sun, air, nor sea water had perceptibly deteriorated the piling thus treated.

The company is now equipped to take 100 tons a day of ocotillo, which is gathered by Mexican laborers, who get $6 a ton for the shrubs delivered at the mill. The entire plant, except a short root, is used. From the loading platform the plants are hoisted to a chute, whence they are fed to a "hog," which grinds them into small chips. The chips are then put in a retort and decomposed by oil heat, and the volatile pyroligneous acid passes like steam through pipes to condensing vats underground, leaving the gums and tars in the closed vessel. The gums are separated from the tars with suitable solvents, and are sent to separate factories, while the liquor is shipped to a third factory. The Arizona plant makes no finished products.

One ton of ocotillo yields 306 pounds of charcoal, 206 pounds of tars, 130 gallons of pyroligneous liquor, and 173 pounds of gums. While the charcoal is said to be superior to willow or poplar charcoal for sugar-making, powder compounding, or absorbing emanations from radio-active water; while the pyroligneous liquor is said to be rich in acetic and carbolic acids, as well as wood alcohol, a synthetic oil rivalling linseed, and other substances useful in the arts; while the tars contain a high percentage of creosote and have in the laboratories yielded 104 fractions, including most of the dyes, drugs, and synthetic preparations hitherto imported from Germany; it is from the gums that there is extracted, after supplying material for lacquers, a substance said to equal first-class crude rubber, identical with it chemically, and capable of perfect compounding and vulcanization. This rubber content is 5 per cent of the whole plant.

A material practically akin to hard rubber or ebonite, it is said, has been made from the residue of the tars and has shown dielectric or insulating qualities equal to gutta percha. From this product the company intends to produce a compound for unbreakable talking machine records. The investigators have also discovered a cellulose from which may be made non-

inflammable motion picture films. All the processes so far perfected have been protected with patents. Incidentally it has been found that ocotillo fiber is even stronger than ramie. Dr. Weisgerber has had two tires made of such fabric, well frictioned with gum, and which are still good after 22,000 miles' use on a heavy sedan run mostly in a rough country.

Ocotillo, diminutive of "ocote," a kind of Mexican pine, and which is one of the candlewoods of the great arid region of the Southwest, known botanically as *Fouquieria splendens*, is a shrub with naked, wandlike, thorny branches, which, usually in February, after a brief rainy season, puts forth foliage and clusters of bright scarlet flowers. The stems have long been used for poles and wired for fencing. The plant is usually ten feet tall. The supply is practically inexhaustible. Soon after it is chopped off close to the root it starts to sprout again. While lying in heaps in the yard, even three months after cutting, it often puts forth its flowers. The Mexicans say that it has more lives than a cat, and that the only way to kill it is to burn it, root and branch. Officials of the company say that there is enough ocotillo within a fifteen-mile radius to keep their plant running at full capacity for fifty years.

Nor is the company satisfied with its present achievements. It is also experimenting with the species of cactus known as the "saguaro" (*Cereus giganteus*), from which it is predicted a yield of 11 to 12 per cent of rubber will be readily obtained. The saguaro, the largest of the cacti family, often attaining a height of sixty feet, is an arborescent plant growing abundantly in Arizona and New Mexico, with sparse, candelabrum-like branches, bearing yellow flowers and edible fruit.

The company's plant is located in a plain, which for heat and aridity during the long summer is said to be rivalled only by Death Valley, California. A temperature of 132 degrees F. is often reached. Water is to be had only from deep-driven wells. It is described as a country of almost endless sunshine, burning alkali sand, rank thorny growths, vipers, lizards, Gila monsters, scorpions, rattlesnakes, tarantulas, stinging flies and poisonous beetles. Yet the workers manage to adapt themselves fairly well to the unfavorable natural surroundings, and the company considerately makes the hours of labor as few as possible in the more torrid season.

RUBBER TECHNOLOGISTS FOR THE BUREAU OF STANDARDS

The United States Civil Service Commission announces open competitive examinations for the positions of associate technologist in rubber, textiles and other subjects, salary $2,000 to $2,800 a year, and assistant technologist $1,400 to $1,800 a year. Vacancies in Washington and elsewhere are filled from these examinations.

The Bureau of Standards covers a wide field of work in physics, chemistry, engineering and industrial technology, including research and standardization, and offers valuable experience in these professions, combining as it does theoretical, experimental, and practical work. The duties of the appointee will be in connection with original investigations in some field of the Bureau's work. The chances for advancement are good. Experience in the Bureau is considered an admirable training for scientific work, and its close connection with the industries makes it particularly valuable as a training in industrial research.

Competitors will not be required to report for examination at any place, but will be rated on the required subjects, such ratings being based upon the competitors' sworn statements in their applications and upon corroborative evidence adduced by the Commission. Papers will be rated promptly and certification made as the needs of the service require.

Applicants should apply for Form 1312, stating the title of the examination desired, to the Civil Service Commission, Washington, D. C.

THE MEASUREMENT OF CRIMP IN YARNS AND FABRICS[1]

By A. N. Gadsby and E. D. Walen[2]

IN THE PROCESS of weaving any fabric the raising and lowering of warp threads causes them to bend around the filling threads and assume a wavy shape. The filling threads are also bent out of their natural straightness by the pressure of the warp threads. The relative amount of waviness in warp and filling depends upon the nature of the threads, the method of interlacing and the subsequent treatment of the woven material.

In fabrics used for structural purposes, such as tire fabrics, the absolute and relative amounts of the waviness in two systems of threads becomes a consideration of much practical importance. The elastic properties of the fabric depend not only upon the yarns used, but also upon their interrelation. The purpose to be constantly kept in mind is to attain the condition that all parts of the material shall be affected by the stress of working conditions in proportion to their ability to withstand that stress. The relative elasticity of the fabric in warp and filling directions tends to determine the distribution of the stresses.

There seems to be some lack of clearness as to the meaning of the term "crimp," owing to confusion with the shortening of yarns during weaving, commonly called "take-up." The stresses of weaving, the retention of the yarns in a distorted position, and the treatment which they may receive while in that position, all help to alter the yarn permanently; so that, from the point of view of the fabric, the original properties of the yarn are not those which need be considered.

As applied to tire fabrics, crimp should be considered as the difference in distance between any two points on a yarn in a fabric and between the same two points after the yarn has been removed and straightened. The difference between crimp and take-up consists of the permanent elongation of the yarns incident to the processes of weaving and finishing. It is impossible to make a determination of take-up from an examination of the finished material. This term should only be used in connection with calculations involving the length of yarn required for a piece of cloth, the yarn being as received from the spinning or twisting machinery.

The determination of crimp involves making two measurements, first, in the fabric, and then after removing and straightening. The only difficulty met in making this determination, is that of producing straightness without also producing elongation due to the use of tension. The method commonly used is the crude one of holding the yarn fast at one end and passing the thumb over it toward the other end. This method is so obviously inexact and dependent upon the identity of the operator that it requires no further comment.

Another method suggested and frequently used is to apply a definite tension on one end, by the use of a spring, a weight, or other means, holding the other end fast. The objection to this method is that the load is arbitrarily selected and that it is by no means certain whether the crimp has been completely removed and whether no elongation has taken place. As no two yarns stretch the same amount when subjected to the same load under like hygroscopic conditions, crimp determinations upon different yarns, using a constant load method, are not comparable.

Since it seemed likely that a yarn would stretch under any tension, it was decided to make a study of its behavior under various tensions and to deduce from this the length of the yarn when straight and under no tension. Accordingly the instrument shown in Fig. 1, was constructed.

In using this instrument the yarn is securely clamped in a jaw

[1] Published by courtesy of the American Society for Testing Materials. Paper read at the annual meeting of the Society at Asbury Park, New Jersey, June 22-24, 1920.

[2] Formerly assistant physicist and laboratory assistant, respectively, of the Bureau of Standards, Washington, D. C.

at one end and a weight pan is suspended from the other end. A crossbar attached to the scale pan and resting against guides prevents the untwisting of the yarn. The small amount of friction between cross bar and guides may be reduced to a negligible quantity by causing the latter to vibrate.

The insert in Fig. 1 shows the method used for making readings. A spring brass clamp carrying an index mark is fastened to the yarn. The movement of the index mark over the scale may be observed directly as the weight on the scale pan is increased. The scale is graduated in half-millimeter divisions and readings may be made to quarter-millimeters easily and to smaller sub-divisions with a little practice. The weight of the lower clamp, crossarm, weight pan, and yarn below the clamp are included in each statement of the tension applied.

To make a determination of straight length, the yarn is fastened in the upper clamp of the instrument, a load of 2.5 grams is applied, and the spring brass clamp is fastened at a point 400 millimeters below the upper clamp. After allowing one-half hour for the yarn to adjust itself to this condition, the reading is taken opposite the index mark on the scale. Additional loads are then applied up to 340 grams, one-half hour being allowed before each reading. It has been found by experiment that, after this time has elapsed, the unit elongation per unit of time is very small.

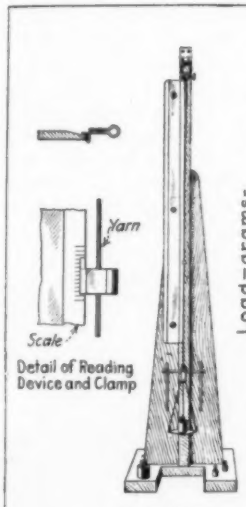


FIG. 1. CRIMP MEASURING APPARATUS. INSERT. DETAIL OF READING DEVICE

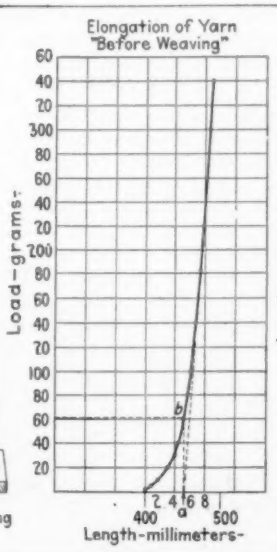


FIG. 2. ELONGATION OF TIRE FABRIC YARN BEFORE WEAVING

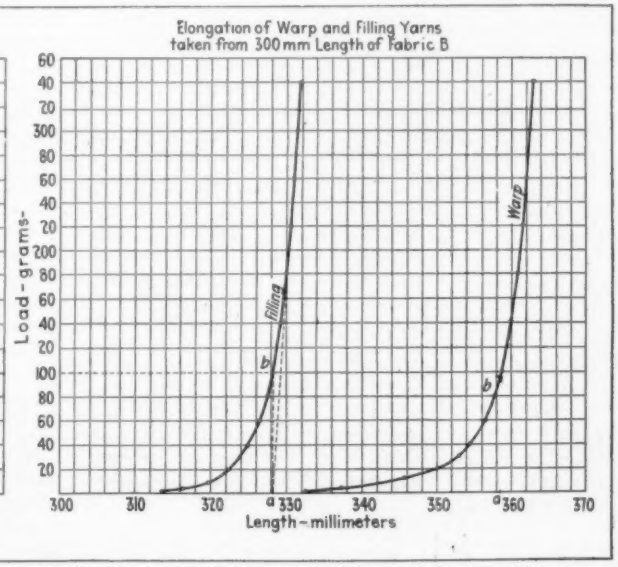


FIG. 3. ELONGATION OF TIRE FABRIC WARP AND FILLING YARNS

The stress-strain curve obtained from plotting loads and length readings is shown in Fig. 2 for a typical sample of yarn used in making tire fabrics. It may be observed that this curve tends to become a straight line after a load of about 150 grams has been applied. By extending this line to cut the line of zero tension a point (a) is obtained which shows the length that the yarn would have had initially if there had not been present waviness in the fiber and other conditions tending to prevent the constant unit increase in length for unit increase in load. This length may properly be considered as the straight length of the yarn under no tension.

It is evident that, before weaving, yarns contain crimp as understood in this paper, this crimp consisting of various elements having to do with the nature and interrelation of the fiber and the strands in the yarn.

If a line (ab) is erected perpendicular to the line of zero tension at the point (a), it intersects the curve at the point (b), the distance (ab) indicating the load it is necessary to apply to the yarn to obtain this theoretical length directly. It is, however, advisable, in order to expedite the determination, to use a greater load capable of producing the same length in a shorter time. This load may then be applied to all yarn of the same kind for the proper length of time, and the full straight length determination need be made only when greater precision is required.

To make crimp determinations the marks are placed on the yarn while in the fabric, the yarn is removed and the straight length determined as above. The total crimp in this case consists of the sum of the additional length caused by waviness of the yarn in the fabric and that caused by looseness and waviness of fiber and single yarn elements. Fig. 3 shows the results obtained from determinations made on warp and filling yarns taken from a tire fabric. It is evident that the warp yarns contain much more crimp than the filling yarns.

Having determined the straight length (oa), the percentage of crimp is obtained from direct comparison with the length measured in the fabric. If we designate this length as L, the formula may be written:

$$\text{Crimp} = \text{oa} - \text{L}$$

and

$$\text{Percentage crimp} = \frac{\text{oa} - \text{L}}{\text{L}}$$

This formula is based on the length in the fabric, which would appear to be the logical basis because the determination used the fabric as a starting point. If, for any reason, it is desired to use the straight length as a basis, the formula:

$$\text{Percentage crimp} = \frac{\text{oa} - \text{L}}{\text{oa}}$$

may be used, provided that it is expressed or understood that the straight length basis is being used.

All determinations were made upon yarns which had been previously, and during the experiments, exposed to an atmosphere constantly maintained at approximately 65 per cent relative humidity and 21 degrees C. temperature.

Making Rubber Heels for a Hundred Million People

Explaining Interesting Developments That Have Increased Demand and Discussing Modern Production Problems That Confront Manufacturers of Rubber Heels

By Chester C. Burnham

THE DEMAND for rubber heels is increasing by leaps and bounds. If you doubt the correctness of this statement, a survey of the prominent shoe windows in your city will offer partial proof of its veracity and a visit to several shoe repair shops will complete your education. For further proof, a letter to any well-known shoe manufacturer should establish the fact that a vast number of shoe retailers now insist on complete lines with rubber heels as original equipment, and also the further fact that a rubber-heeled line will very often outsell its leather-heeled duplicate. It is easy to understand that with rubber heels furnished as a matter of original equipment the resale proposition is doubly easy and when it comes to replacing these worn down heels, it is usual for the customer to ask for the same kind of heels. A careful observer will note that a man or woman rarely enters a cobbler's shop to have rubber heels applied, without a definite idea of just what kind of a heel they prefer. It's a matter of education and the first lesson was given when they bought the shoes with the rubber heels attached.

With all this proof available there are some rubber manufacturers who have spent considerable money in trying to put a rubber heel on the market and have finally given it up as undesirable or unprofitable business. Undoubtedly there are good and logical reasons for their failure to put their plans across, but the fact remains that there is still a shortage of rubber heels as will be shown by the figures herein.

Rubber heels have been more readily accepted than were rubber soles, but their introduction and increased sale has not been a bed of roses for the persistent sales and advertising managers who have believed they were right and have forged ahead. Twenty years ago, the rubber heel enjoyed only a limited demand. Only a very few manufacturers of walking boots and women's house shoes ventured to offer rubber heels attached to their regular lines. More often the purchaser was obliged to have them applied as an "extra" and very often indeed the customer decided to wear down the leather heels before having rubber heels attached. Perhaps it was a spirit of thrift that prompted this course, but certainly very few persons were then impressed with the comfort and ease to be had with rubber-shod heels. Of course there were not miles of concrete sidewalks and yards of hardwood floors to walk upon in those days. The dirt sidewalks and carpeted floors did not seem to require heels protected with rubber. Here and there one would encounter an ardent admirer of rubber heels but it was the exception and not the rule. The change in living conditions and environments certainly played an important part in the changed demands for rubber heels, and with mosaic floors in public buildings, hardwood floors in homes, concrete sidewalks and a general use of composition and stone floorings in all newer buildings, the public began to incline more favorably toward the idea of cushioning its heels with rubber. Those who disliked that "creepy" feeling which rubber heels gave, were later inclined to overrule this objection when the matter of greater comfort was concerned. Those who were afraid of slipping on rubber heels, found that this idea was largely bugaboo and that the greater comfort of rubber heels warranted their wearing them and exercising greater care where there seemed any likelihood of slipping.

POINTS OF DISTINCTION IN RUBBER HEELS

I have said that some manufacturers tried to manufacture rubber heels and gave it up as unprofitable and I believe that in some of these cases the unprofitable venture was due to the fact that they manufactured rubber heels without a strong dominating feature to recommend them to the public. Not all people look for the same qualities in clothes. Some demand style at the expense of wear, others expect silk linings even if the cloth itself is low grade. So it is with rubber heels; no one heel seems to carry all the honor points, but each successfully marketed one has definite points of merit which are the fundamental points upon which a large business has been established. To illustrate my point more clearly let me call your attention to the illustrations herewith. Fig. 4 shows the common or "garden" variety of rubber heel, manufactured in large quantities, sold without brand or guarantee, made out of an almost unlimited variety of compounds and varying in wearing qualities from good to very poor. Heels of this type are often found on cheaper shoes, in fact, the quality of this heel usually lines up pretty well with the quality of the shoe to which it is applied. There is no reason why a heel of this shape and appearance may not be made to wear and be as good as the best, but somehow the lack of a brand or maker's name seems to invite adulteration and inferior compounds. Among the illustrations you will note many familiar heels and you will also note that each heel has had a definite reason for its success. That is a strong point to be considered in the further development of the rubber heel business. It is not enough to merely decide that you can produce a few thousand rubber heels per day and start in using any old compound or any old molds available. On the other hand it is fairly certain that a good heel, properly exploited, can build up a profitable business in a remarkably short time.

RUBBER HEEL PRODUCTION TODAY

No definite figures are available regarding the present-day rubber heel production, but it is a known fact that there are several manufacturers who are producing somewhere near 100,000 pairs of heels daily, several others who have reached a production of around 50,000 pairs daily and a dozen more who can easily rate their output at from 5,000 to 15,000 pairs per day. In addition there are many specialty manufacturers who have steady but somewhat limited outputs. With all this production in mind, I do not believe I would be overestimating the combined production if I set the figure at around 500,000 pairs per day.

For the sake of comparison, let us consider these figures along with the shoe production figures. The latest directory of shoe manufacturers records approximately 1,000 shoe manufacturers in this country and sets their daily output at around 2,059,400 pairs. It is entirely fair to discount these figures considerably when estimating on a yearly basis, because it is a known fact that the shoe trade is not regularly employed at capacity output for more than 200 working days in the year. Using this as a basis, we find that there is a tidy little total of 411,880,000 pairs of shoes produced each year of which a large percentage might well carry a pair of rubber heels as original equipment and require another pair or two for replacements. Thus we perceive that our rubber heel production, large though it may appear to be, would equip about 25 per cent of the manufactured shoes if the factories produced rubber heels 200 days per year. These figures do not include the demands of the repair trade. Possibly these figures may present the matter in the most glowing fashion, but the comparisons throughout are fairly relative.

As we have intimated in the foregoing, the greatest demand for rubber heels of the early type was for women's house shoes. There are several trademarked lines of footwear now on the market that owe much of their present-day popularity to the foresight

of their manufacturers in affixing rubber heels to them as original equipment. In those early days, the "pneumatic" idea predominated in rubber heel construction. Nearly every rubber manufacturer further tried in some way to get a cushion of air underneath the rubber heel or between the rubber heel and the shoe. Perhaps they were a bit skeptical about the cushioning powers of their rubber heel compounds in those days. However, it is a fact that numerous rubber heels appeared on the market which were built especially for "nurses'" shoes (this term clung tenaciously to all classes of footwear designed for indoor wear by women) and which had little to recommend them in the way of quality or wear. Such heels were sold remarkably cheap; often as low as four cents and at an average of around six cents per pair.

RUBBER HEELS REPLACING LEATHER

When leather was cheap, it is doubtful if a pair of good leather toplifts for a ladies' house shoe could be bought for four cents per pair. And even if bought for less, the shoe manufacturer had many special operations of finishing that were not necessary with a rubber toplift, as the half-rubber heel came to be called. With leather, there was the brass wire slugging to be done around the edges and numerous waxings, brushings and wheelings to be carried on, but with the rubber heels, they need only be nailed on, given a quick drying dose of heel ink and a quicker brushing out with a revolving brush. Production was speeded up, costs were about equal or slightly less and sales were soon found to be in favor of the rubber-heeled shoes when compared with their less resilient, more noisy, leather-heeled sisters. The women came to like rubber-heeled shoes around the home, for they were quiet and restful.

With these facts evident during the normal leather markets, imagine the state of the shoe manufacturer's mind when leather began to advance by leaps and bounds. No sole leather was cheap and all of it was so valuable that even the trimmings were begrudged for toplift use. Conservation of sole leather was preached through the trade press and by word of mouth from every leather merchant, and soon many materials other than leather began to creep into shoes at such places as insoles, outsoles, counters, box toes, tips, tops and heels. Then came the great incentive to use rubber heels in quantities hitherto undreamed of. Urged by necessity, it was soon found that rubber heels satisaed the bulk of the trade far better than the poor quality leather heels and it was found also, that they could be applied much more cheaply and with less trouble than leather heels.

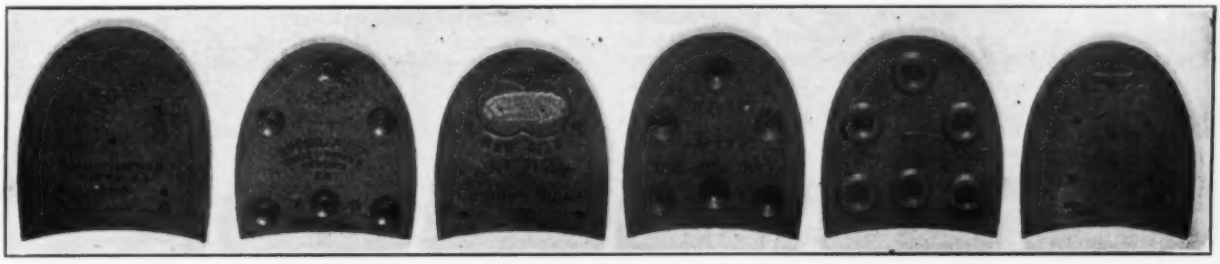
HALF HEELS OUTSELL WHOLE HEELS

About this time the rubber heel business began to look itself over. The manufacturers discovered that they had overlooked points which when corrected would unquestionably improve sales. They found that there were definite needs in the shoe manufacturing field to be considered; that rubber half heels were better sellers than rubber whole heels, and consequently they began to balance their equipment accordingly. They learned that the idea of making a half heel with a flat back was entirely wrong because when nailed to the underlifting it developed a tendency to spring away at the edges and left an unsightly looking edge. They corrected this by cupping it, but they easily went too far the other way and the heels had a sunken look after nailing. So they tried again and found the happy medium degree of cupping that produced the best results. At the same time, they learned that the appearance of the rubber heel had a great deal to do with the sale of the shoes and they accordingly gave the matter of mold making more attention.

Up to this time no one had given any thought to the quantity application of rubber heels, but the increased demand and the changing needs soon found the heeling rooms crowded with racks of shoes because they could not attach them fast enough by hand to keep up with the other machine processes of production. This quickly brought about a demand for a machine nailing method of attaching rubber heels. Those who lacked vision said it could not be done, and in truth there were many who scoffed at such an idea, but after a great amount of constructive and research work on the part of a prominent shoe machinery company that manufactures most of the heeling machines in the shoe world, certain definite and constructive steps were taken with the rubber manufacturers and "machine nailing" got its start.

ATTACHING RUBBER HEELS BY MACHINERY

Heretofore, there had been no standard for setting the nail holes in rubber heels. One rubber manufacturer built heels according to his ideas, and another with varying ideas built his heels differently. Many were guided by economy and put in as few nail holes as possible, for nail holes meant washers and added labor in handling, and others, believing that the more nails the better the heel would stay on, insisted on plenty of them. Some placed them near the edge of the heel and others placed them too far inside the edge. A few decided to omit the metal washers entirely and make the compound tough enough to hold the nail-head, while others had a special plate that took the place of the many washers. Various patents were obtained at that time and many are in use to-day.



TITE-EDGE SPRING STEP NON-SLIP SAFETY CUSHION AIR HEEL SUCTION SHAPE

SUCCESSFUL RUBBER HEELS HAVE STRONG DOMINATING FEATURES THAT RECOMMEND THEM TO THE PUBLIC

Progress required that there should be some unanimity of opinion on all these matters and some standard of nailing established. So, despite the apparent hopelessness of the task, a well-known machinery company finally presented to the rubber heel manufacturers a composite template of nail-hole layouts that would leave each manufacturer free to decide how many nail-holes his heels might have, how near the edge they might be placed, and permitted him to follow almost identically all of his former practices and only required agreement to a few minor points which did not antagonize and really mattered very little. It really was a wonderful piece of diplomacy and design that was offered to the rubber trade and it readily found favor because of its fairness. No sooner was this standard template plan outlined to the rubber manufacturers than there was a mad scramble to get heels on the market made according to this new standard. Unfortunately, there did not seem to be much time to do much experimenting

and the market was soon in a strongly competitive condition and flooded with rubber heels made after the new ideas.

NAILING MACHINES PROVE SUCCESSFUL

There were a number of enterprising shoe manufacturers who at once installed these nailing attachments for their regular heeling machines and tried out the new process. It was soon demonstrated that the greater driving and clinching force of the machine driver aggravated the defects in the flat-backed heels and that whereas some manufacturers had continued to use them by adopting careful hand nailing methods, they were now impossible. Those who had not already changed their molds in this respect found that it was necessary to do so and so they remade their back plates so as to give the heel a slight concavity. The real aim, of course, was to give the heel enough concavity to make it offset the spring at the edge.

Hardly had this been done before an avalanche of reports poured in that the rubber heel nail-holes did not fit the driving fingers of the driving head. Careful measurements and comparisons were made with the key template and mold but no variations appeared. It was evident that the mold makers had done their work well, for almost no variation was found in thousands of cavities, but all had overlooked the fact that when the rubber heel was removed from the molds while hot, it shrunk when cool. This shrinkage varied with different compounds but it was found to be sufficient in most cases to pull the nail-holes out of line although the molds had originally conformed with the template measurements.

TROUBLESOME WASHERS

It must be understood that a modern shoe factory is a most sensitive organization and a single rack of shoes that does not proceed in its orderly and regular manner through the various rooms may cause no end of trouble and actual productive loss. The machine operations are so swift that a single heel jamming in a nailing machine may easily tie up a machine for a number of hours. Or the shoe itself may be spoiled, causing a loss quite out of proportion with the loss of the heel itself. This misalinement of nail-holes called for quick action on both sides and it was soon discovered that the only way to remedy this defect was to correctly determine the amount of shrinkage in a given stock and allow that much variation when placing the nail-hole posts or studs in the molds. A wide range of heel stocks had been the fashion, but this discovery resulted in cutting down the number of different compounds considerably and rubber manufacturers who had been making their compounds in a more or less hit-or-miss fashion out of every available kind of scrap now came to realize the desirability of standardization in compound as far as possible. The matter of stock shrinkage now became another definite factor to be reckoned with when compounding heel stocks, as also did the different properties of black, tan and white compounds. Some of these compound problems might have been very much more difficult had it not been for the invention of the conical washer or burr.

THE CONICAL WASHER INTRODUCED

Undoubtedly, the success of the machine nailing process for rubber heels would have been considerably delayed had it not been for the introduction of the conical washer. It was found that with the flat washer, a very slight variation was sufficient to jam the heel in the machine, and even though the driving fingers were purposely made of long springy steel wire construction to adjust themselves slightly to inequalities in the positions of the nail holes they very often did not function properly if the nail holes were the least bit out of line. On the contrary, it was found that with the conical washer some inequalities might exist and still fail to interrupt the successful operation of the nailing machine. The theory of this conical washer was that its sloping sides served as a guide for the driving fingers and that by taking advantage of the spring in these driving fingers, the conical washers permitted the nailing of heels which would be impossible were they constructed with flat washers. This theory proved entirely sound in practice and the conical washers were soon adopted as standard by the leading manufacturers of rubber heels.

Production was somewhat disturbed by the discovery that while an operator might rapidly place the flat washers on the studs or washer pins without any particular care or attention, the same operator must proceed much more slowly if he were to apply conical washers, as they all had to be applied right side up. A single conical washer inverted meant the undoing of all that had been done in a constructive way, as it made a heap of trouble in the shoe factory even though it was not discoverable after the heels were molded. This operation of molding heels was mostly a piece-work operation and the price scale was necessarily adjusted to suit the new requirements. In spite of the increased wage schedule, the production figures were lower and in some places the work was handled by two men working together, or a man and a girl. The one applied the washers to the washer-pins and dusted the molds, and the other handled the presses and removed the contents ready for the refill. This plan resulted in more contented workers but did not bring the production figures back to where they were under the flat washer plan.

Some idea of the number of washers handled in a single day may be gained from the following. A single workman often handled five presses, molding twenty heats a day on each, and carrying three 20-cavity molds to each heat for each press. Theoretically, this meant a grand total of 3,000 pairs of heels per day for one man and a total of 30,000 washers to be placed right side up with care, counting five washers to a heel. Some accuracy was required to have every one of them properly placed. There were those who thought to divide their production by using conical washers on heels for the shoe manufacturing trade and flat washers for the shoe repair trade. This was possible but hardly practical, as the slightest mix-up meant an endless amount of trouble. If the wrong kind should happen to get to the machine nailer, a tie-up might result that would cost many dollars in lost production. Thus it remained pretty near standard practice that conical washers should be molded into all standard heels. There are those who still believe that the flat washers can be satisfactorily used with the machine nailing attachments, but they are in the minority and their product suffers by comparison on this point, if in no other, when viewed by a cautious and far-seeing purchasing agent. Even if the purchasing agent should procure heels with flat washers, there are few heeling machine operators who would take chances to tie up their day's earnings at piece-work rates by using the flat washers, and you will see many an operator starting to use a new heel for the day's run cut one open with a knife in order to ascertain what style washer has been used.

HIGHER COST LEATHER FAVORS RUBBER HEEL SALES

While it is in every sense true that the public have become more kindly inclined towards rubber heels, it is true that they have been quietly if unconsciously aided in changing their minds by some rather interesting and unusual trade conditions. As we have said in the foregoing, only the cheaper grades of leather went into toplifts and heeling, and of course only the poorest kind of wear resulted. This did not satisfy purchasers of footwear and they soon learned that a good rubber heel would outwear several pairs of poor leather or paper heels. About this same time the shoe manufacturer awakened to the fact that with his factory properly organized and his heeling gang working harmoniously by the machine nailing method, it was less costly to make shoes with rubber heels. To appreciate this statement properly one must understand the several processes and parts that go to make up the heeling operation and the heels.

A complete leather heel consists of several separate and distinct parts known as a rand or "dutchman" (Fig. 1), a base (Fig. 2), which goes on top of the rand, and a toplift (Fig. 3), which is the topmost lift of the heel. Shoe manufacturers formerly made their heels complete in their own factory but now they buy these several parts from as many different specialty manufacturers be-

cause the matter of heels has become a highly specialized business. Sometimes the rand and the base are combined in one unit and especially is this true of paper or fiber heels. At other times the rand is first tacked to the heel seat of the shoe, then the base is nailed on by the heeling machine, and finally the toplift is nailed on top of all and is slugged with brass or zinc finishing nails for appearance. After that, the heel is rough trimmed by a special cutter, breasted or trimmed evenly on the front side of the heel and is then sanded and scoured on the breast and outside. Next comes a coat or two of wax heel ink and then a brushing and burnishing for finish. It is quite the thing in some lines of shoes to add to all this effort a fancy wheeling effect produced with a hot wheeling iron.

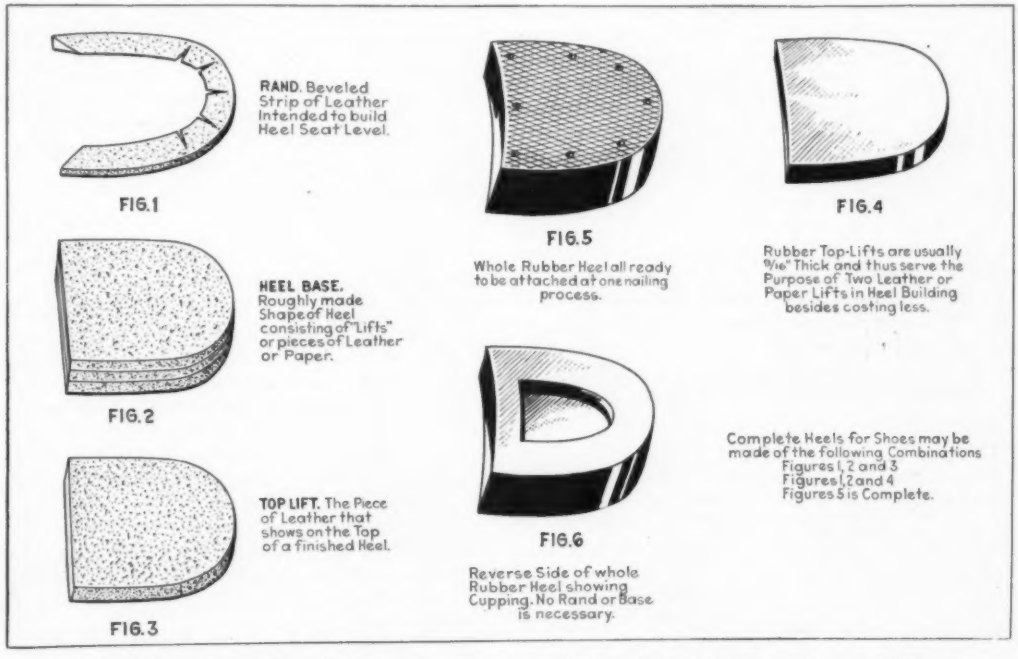
A whole rubber heel comes all shaped up to fit on the heel seat of the shoe (Figs. 5 and 6) and is first cemented and then nailed to the shoe with one machine-nailing operation. There is no toplift to bother with, no breasting, no rough trimming, no burnishing wax, no fancy slugging with brass or zinc wire, no wheeling and no assembling of the various parts as in leather heels. After it is nailed on, the heel is scoured on a sandpaper wheel and is then treated with one coat of special rubber heel ink and brushed out with a revolving brush.

Even to the layman the comparison of processes reveals the fact that the whole rubber heel certainly requires less labor, to say nothing of the number of parts that must be kept in stock and assembled when leather heels are required.

about the effect that one gets in wearing such a shoe. The specific gravity of compounds for whole heels should be less. The importance of perfecting this detail is apparent after comparing the figures above and estimating the saving to be effected in a year's output of shoes equipped with whole rubber heels. It is indeed strange that no rubber manufacturer has successfully marketed a whole rubber heel as light in weight as a leather heel.

GREATER PUBLICITY DESIRABLE

I could go on telling of the changes in design and methods which have had a goodly effect upon the sales of rubber heels and more particularly upon the public acceptance of them. What we now need is a closer study of the demand and the plan for merchandising them. Let the farmhand and laborer know that a whole rubber heel will outwear several pairs of leather heels such as he habitually gets on working shoes. Call his attention to the reason why his last pair of farm shoes lost their heels because the iron nails that held them corroded off after constant contact with ammonia and lime. Tell the railroad man why the underlifting on his heels squashed out because he was standing on the wet floor of the firebox area. Tell the public in general how much more wear they can get out of a rubber heel. Tell the parents how desirable it is for their children to wear rubber heels. It reduces the jar on their sensitive nerve centers just as it does on grown-ups, it's as quiet in the home and in the schoolroom as your own rubber heels would be. Would walking hold the same pleasures for the elderly if rubber heels were denied? Are they less afraid of walking on rugs and polished floors when rubber shod? Do



THE WHOLE RUBBER HEEL REQUIRES LESS LABOR AND FEWER PARTS THAN THE LEATHER HEEL

I said in a previous paragraph that the whole heel had not sold as well as the half heel and apparently because of its excessive weight and improper shape. Unfortunately, most whole rubber heels have the appearance of rubber boot heels and no amount of sanding and trimming have converted them into anything satisfactory in appearance. The greater volume of rubber of a whole heel makes the weight more apparent, and you will get the effect I am trying to describe if you will take a finished boot that has been heeled with a whole rubber heel and lift it by the top. Instead of the toe pointing down as it should, the added weight of the rubber heel will make the heel point down and that is just you appreciate it when your office force dons rubber heels and yet you allow your children to play around home with steel-shod leather heels?

Even a little study of the rubber heel market shows unlimited possibilities. Whether you wish to manufacture a high grade heel or a low grade one your interest can be stimulated if you will visit a high class shoe store for information concerning the high class demand and question the manager of your local 5 and 10 cent store as to the size of his orders for the lower grade article. If you go further and call on a jobber of shoe findings you will be amazed at the traffic in that direction. The possi-

bilities in manufacturing heels for 110,000,000 people are not to be compared to the fly-by-night charlatans who peddle their wares to the unsuspecting public. The field is so fertile that it throws out a challenge to the best manufacturing talent of the rubber industry, and at a time when other lines of your business may be dull it offers a lucrative departure for those who will engage in it seriously.

ACTIVITIES OF THE RUBBER ASSOCIATION OF AMERICA

Following the usual quiet period prevalent during August of each year in the work of the Association, which conditions may be explained by reason of the custom to omit all meetings during that month and the vacation season, this organization's activities have taken new life during the current month, and from all indications seem to point toward a very successful year.

DIVISION COMMITTEE MEETINGS

The Executive Committee of the Rubber Sundries Manufacturers' Division met in New York on September 14, and a most interesting discussion was held, not only with respect to those subjects presented in the docket, but general trade conditions as well.

There was a meeting of the Executive Committee of the Tire Manufacturers' Division held in the Association rooms on September 22, at which some questions of paramount interest to all tire manufacturers were considered. There was also present at the meeting a committee representing the Federal Highway Council, composed of S. M. Williams, chairman of that organization, Mr. Dahl, vice-president of the White Co.; Mr. Brosseau, president of the International Motors, and Mr. Blodgett of the Autocar Co., and these gentlemen explained the work of the Council in its relation to "good roads" throughout the country.

QUESTIONNAIRE NO. 102

The report with regard to responses received under questionnaire No. 102 recently sent out by the Association which has been submitted to the Association by the Guaranty Trust Co., which is acting as its statistical agent in the matter of questionnaires, is very gratifying, and it is hoped that Questionnaire No. 103, which is to cover the period from January 1 to June 30, 1920, will shortly be promulgated.

APPEARANCE OF THE TRAFFIC COMMITTEE BEFORE THE RAILROAD FREIGHT CLASSIFICATION COMMITTEE

The Railroad Freight Classification Committee held hearings during the month of August concerning two subjects which are of a great deal of importance to the rubber industry. One of these subjects was with respect to the application of the Traffic Committee for a reduction in the rates applicable to pneumatic tires in carloads to points west of the Mississippi River, generally known as western classification territory. Proposal of the Traffic Committee was for a reduction in ratings on pneumatic tires in carloads from second class to third class with a minimum carload loading weight of 20,000 pounds, the same as applies in Eastern and Southern territories. As a counter-proposal, the Classification Committees proposed third class rates uniformly throughout the country with minimum carload loading weight of 24,000 pounds. The Traffic Committee appeared at this hearing and submitted statistics and other facts which it is felt conclusively upheld its contentions that third class rates are proper for this class of traffic, with a minimum carload loading weight not to exceed 20,000 pounds.

The other subject before the Classification Committees was with respect to a revision of the specifications for railroad containers for shipments of rubber footwear. It was proposed by the Classification Committees that all containers for rubber footwear be protected against losses through pilferage and other causes by additional metal straps, and analysis of this proposal developed that the expense that would be placed upon the footwear manufacturers would result in greatly increased costs totaling several hundred thousand dollars annually. Statement was made by the Railroad Classification Committees that this investigation had brought out so much additional information, a great deal of which is submitted by the Traffic Committee, that a further investigation will be made by the carriers before any definite action is taken by them. With respect to this matter, it is also confidently felt that the facts submitted have convinced the Classification Committees that no change should be made in the present regulations of the carriers.

SEPTEMBER MEETING OF THE TRAFFIC COMMITTEE

The regular monthly meeting of the Traffic Committee was held in Cumberland, Maryland, at the Fort Cumberland Hotel. This meeting was a very interesting one, a large number of subjects that had been docketed for consideration having been disposed of. One of the most important matters given consideration is the proposal of the carriers for a freight classification that shall be uniform as to ratings throughout the country. This proposal has not yet reached development where concrete proposals have been made to the shipping public, but is one that is already receiving the active consideration of the Traffic Committee.

SIXTH NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES

The Sixth National Exposition of Chemical Industries was held September 20-25, 1920, at Grand Central Palace, New York.

The exhibits were more numerous than at any previous show and included a wide range of industry. Daily conferences were held during the exposition, at which many chemical and economic problems were discussed by leading experts and many important manufacturing operations were illustrated by moving pictures.

Of the exhibits of special interest to rubber men the following are cited:

The American Hard Rubber Co. showed practical commercial applications of acid-resisting hard rubber. A hard rubber centrifugal pump was shown in operation, in connection with lines of hard rubber pipe and fittings. Two columns of hard rubber, 10 inches in diameter, mark the furthest step that has been made in the manufacture of large pieces in this material. A single acting pump, tanks, pails, dippers, etc., were also on display. A collection of samples of hard rubber which have been subjected to the action of forty representative chemicals for a period of a year demonstrated the actual resistance which this material offers to the commoner corrosive solutions.

The Barber Asphalt Paving Co. exhibited products manufactured from Trinidad Lake asphalt, including Genasco mineral rubber. A brochure was distributed describing and illustrating the operations of mining and refining Trinidad asphalt from Bermudez Lake.

The Bristol Co. displayed their well known recording instruments for pressure, vacuum, temperature, electricity, speed, etc.

The Buffalo Foundry & Machine Co. had an extensive display of full-size apparatus for vacuum drying, evaporating, sugar bag filtration, etc., exemplifying the latest developments in these lines.

J. P. Devine & Co. showed full-size vacuum drum dryers, chamber dryers and other apparatus in process of construction. This company holds a leading place in the chemical industries due to its success in designing important apparatus for the manufacture of explosives and other chemical products demanded by the war emergency.

Eagle-Picher Lead Co. Model of a sublimed white lead plant illustrating the manufacture of this pigment was shown, together

with samples of many lead products for paint, rubber and other manufacturing uses.

THE HUNTER DRY KILN CO. exhibited a model of their humidity dryer for crude rubber and other material, and a varied line of samples of products dried by their process.

INNIS, SPEIDEN & CO. showed samples of industrial chemicals, colors which the company manufacture, also samples of a variety of waxes some of which find use in rubber manufacturing

A. KLIPSTEIN & CO. exhibited a variety of chemicals, colors, dyestuffs, gums, waxes, oils, etc., of which they are dealers. Their classified catalog of these goods shows an extended list of compounding ingredients adapted for the rubber trade.

THE MORSE CHAIN CO. had on view samples of their silent driving chains, which operate at uniform speed and run quietly without jar or slip.

NATIONAL ANILINE & CHEMICAL CO. This exhibit was devoted to showing an extensive line of dyes and intermediates manufactured by the company, displayed to advantage in a stage setting of life-like figures costumed in up-to-date fashions.

THE NEW JERSEY ZINC CO. featured the route of manufacture of their various zinc products from the ore. These products were all displayed, including zinc oxide, lithopone, albolith, a new light-resisting pigment, besides many manufactured forms of metallic zinc.

SALMON FALLS MANUFACTURING CO. Fabric for automobile tire building was shown, impregnated with the sulphur-terpene product known as Toron, which not only increases the tensile strength of the treated fabric but increases the adhesion of rubber to both fabric and rubber, besides producing other important effects. A line of automobiles tires and solid tires was shown in demonstration of these claims.

SCHAEFFER & BUDENBERG MANUFACTURING CO., manufacturer of recording thermometers and gages, exhibited a new type of thermometer and a new watchman's recording attachment applied to their recording gage.

HENRY L. SCOTT & CO. Two testing machines were shown, one electrical, for fabrics, with recording chart device, and one hand-power for paper testing.

C. J. TAGLIABUE MANUFACTURING CO., maker of thermometers, gages and control apparatus for many manufacturing purposes, featured the Witham system of automatic temperature control.

TAYLOR INSTRUMENT CO.'s interesting feature of the exhibit was that showing the development of indicating, recording and regulating instruments.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO. One feature of the display was the arc furnace regulating and control panels. The electric furnace has been an important factor in the successful expansion of the chemical and metallurgical industries, and the Westinghouse company has been closely identified with the development of electric furnaces since their inception.

WHITALL TATUM CO. A very complete line of its "Nonsol" chemical glassware constituted the larger part of this company's display. It was supplemented by an exhibit of rubber corks and tubing for chemical purposes, made by the company.

CRIMSON ANTIMONY[1]

CRIMSON ANTIMONY has been the most generally satisfactory red pigment used in coloring rubber compounds. It has good coloring power, is fairly stable, especially in press cures. In open cures, however, everyone using this pigment has experienced difficulties, on account of its tendency to change from the unstable oxysulphide to the stable black sulphide. This reaction takes place at times only to a slight extent, but sufficiently to ruin the value of crimson antimony as a coloring ingredient, and it is most pronounced on the surface of the rubber compound where it comes in direct contact with the live steam.

Such a variety of possibilities may cause this change, that many explanations are possible. If crimson antimony is not manufactured under proper conditions, it will not cure satisfactorily in open steam, and so far as known there is no chemical test that will detect the difficulty except trial. The presence of too great a quantity of alkaline substances in a compound will always cause trouble; sulphurous acid when present to the extent of 0.2 of one per cent will cause trouble and is positive proof that the crimson antimony has not been properly made. Any crimson antimony will darken if vulcanized in open steam at an excessive temperature. A temperature corresponding to 50 pounds is the limit.

DEVELOPING NEW MANUFACTURING METHODS

Prior to 1914, no satisfactory crimson antimony was made in this country and at least 10 per cent of that imported was not satisfactory for open steam cures. At the outbreak of the war, we realized that it was necessary to find a substitute for crimson antimony, or manufacture it ourselves. The manufacture of crimson antimony, as outlined in the literature, led us to believe that it was easier to manufacture this pigment than to find a substitute. We started to develop a method of manufacturing this pigment by these methods, but soon learned that while the methods outlined in the literature might be satisfactory for manufacturing crimson antimony for calico printing, they were far from giving a product that would vulcanize in open steam, even under ten pounds, steam pressure. We had little success in finding a substitute, so we continued our efforts to manufacture a satisfactory product.

The manufacture of crimson antimony, like that of many other chemical substances, can frequently be carried out in laboratory batches and give satisfaction, but when the same method is tried on a commercial scale it will not be successful. We have developed processes which on a small scale apparently were satisfactory, but on trial in large batches they would invariably darken, the cause of this darkening not always being apparent. We began by trying to obtain antimony trichloride by treating the metal, oxide, and sulphide of antimony with hydrochloric acid. But we were unable to obtain uniformly good results. We eventually discovered that we were not obtaining pure antimony trichloride and that unless this is done a satisfactory crimson antimony cannot be obtained.

If antimony trichloride made by the above methods be distilled, it will invariably be found that water and hydrochloric acid will come from the still, then, antimony trichloride, but before distillation is complete, the material in the flask will change in appearance and the distillation will leave a large amount of antimony tri-oxide. This antimony oxide, when boiled with sodium thiosulphate, does not change to oxysulphide, but to antimony trisulphide.

We tried making antimony trichloride by treating antimony metal with sulphur chloride, the action taking place in an iron retort, and then distilling the antimony trichloride. This gave antimony trichloride, from which we are able to make satisfactory crimson antimony, but the reaction was so violent that it was difficult to control. The retort was short-lived, and we were at a loss to find one which would, for any great time, withstand the action of antimony trichloride, at the temperature at which this reaction takes place.

Graphite retorts were quite satisfactory for a few distillations, but the walls of the retort soon absorbed so much antimony trichloride that they would invariably break when the third or fourth distillations were attempted. Stoneware retorts would probably have been quite satisfactory, but we changed our method before making a trial.

We next made antimony trichloride by passing chlorine over metallic antimony in a water-cooled receptacle from which the

[1]By John M. Bierer, Boston Woven Hose & Rubber Co., Cambridge, Massachusetts.

antimony trichloride was siphoned from the bottom. To this we added sufficient water to prevent crystallization. The substance is antimony trichloride with one molecule of water. This is a definite chemical compound, fairly stable; and does not change to antimony tri-oxide. This material, when added to an excess of water, is precipitated as antimony oxychloride, which is the most satisfactory substance to convert to oxysulphide with sodium thiosulphate. If precipitation is carried out properly crimson antimony will result, which will cure satisfactorily.

COMMERCIAL PROCESS

The following procedure will give good results on a commercial scale:

To 135 pounds of antimony trichloride add 15 pounds of water to keep it in a liquid and stable form while it is being manufactured. This is poured into a large tank containing about 60 cubic feet of water, where it is slightly mixed by wooden paddles and converted to antimony oxychloride. At this point add 21 pounds of whiting to reduce the acid concentration so that the formation of antimony oxysulphide is not hindered when the thiosulphate is added. This step in the procedure is important; for if the reaction is attempted at too high an acid concentration, side reactions take place. Four hundred eighty pounds of commercial sodium thiosulphate are now poured into the tank, and the whole immediately agitated by four steam jets. The steam serves the double purpose of agitating and heating the solution. The heating is continued for approximately ten minutes, or until the desired color is obtained. The steam is then shut off and approximately 250 cubic feet of water quickly run into the tank to stop the reaction. (The time of heating depends on local conditions.)

The material is now allowed to settle and is washed three times by decantation. It is then washed free of sulphurous acid in a filter press, and dried at a low temperature.

We have been continuously manufacturing crimson antimony by this method since the spring of 1915, and during that time have had only 250 pounds of unsatisfactory material, and this was due to carelessness.

Some Aspects of the Stress-Strain Curve

By William B. Wiegand[1]

Much of practical value will be found in the following excerpts from Mr. Wiegand's interesting paper, read before the Rubber Section of the Toronto Branch of the Society of Chemical Industry, February 27, 1920.

STRESS-STRAIN RELATIONSHIP OF RUBBER

Among the many interesting physical properties of rubber, perhaps the most extraordinary is its stress-strain relationship. The general characteristics of the rubber stress-strain curve are familiar to everyone. They were first described in detail by Villari in 1869. Hooke's Law of proportionality of stress to strain, which is universally true of most of the structural materials within their elastic limits is, of course, not valid. The ratio of stress to strain is constantly changing. In other words, Young's modulus of elasticity is in the case of rubber not a constant but a rate. Nevertheless, rubber is the only substance for which Young's modulus is anything else than a mathematical calculation. You can actually measure Young's modulus in the case of rubber, because you can stretch it to twice its length and measure the stress required to do so.

Rubber is the only substance for which the elastic limit extends out as far as the actual rupture point. Whereas, in the case of metals, the first part of the curve is stiff and the latter parts show a yielding region, vulcanized rubber is yielding at first but stiffens or tightens up later on. These extraordinary stress-strain relationships of rubber attracted the attention of some of the most brilliant physicists of the 19th century.

The most exhaustive and masterly studies of the elastic properties of vulcanized rubber were carried out by Professor H. Bouasse of the University of Toulouse, who published his memoirs in 1904. Bouasse had carried out extensive work on the elastic properties of other materials and was attracted to rubber by the unequalled large scale of its properties of extension. He saw an opportunity of, as it were, magnifying the ordinary elastic constants and being able to study the phenomena of hysteresis and of the effect of temperature on these properties to better advantage. Bouasse worked in the main with pure gum mixings containing only rubber and sulphur.

The following are examples of Bouasse's well-established generalizations. They are valid both for pure gum and for heavily compounded mixings.

1. The elastic modulus decreases with increasing elongation, passes through a minimum and then increases rapidly up to the breaking point.
2. As the cycles are repeated the modulus corresponding to any given elongation decreases, first, very quickly, then slowly, finally reaching a practically constant value. Thus, in arbitrary units, a series of values for the first three cycles (at a given elongation) were 816, 535, and 460.
3. The hysteresis in the moduli is also very great after the first cycle, but is already small in the third cycle, and after five cycles is almost gone.

Perhaps Bouasse's broadest generalization, and one which has profound technical significance, is the following:

> Every stretching of vulcanized rubber, every reduction in length, in general every change of form, tends to diminish the value of the modulus corresponding to any given elongation. Also every rest tends to augment it and this augmentation increases in proportion as the position of rest is nearer to zero extension.

Practical illustrations of this will occur to all. A stiff rubber band can be "softened" by a few preliminary stretchings. A laboratory test piece which slips out of the jaws of the testing machine before rupture gives, on retesting, quite abnormal values. In short, the physical properties of vulcanized rubber (as of course those of crude rubber) are a function of its previous life history.

HYSTERESIS

Let us turn to the question of the retraction curve, which differs markedly from the extension curve. The area contained between the two curves is called the hysteresis loop. There is no more important quantity in the whole rubber technology than the area of this hysteresis loop. Boileau, in 1856; Villari, in 1869, and, above all, Bouasse and Carriere, in 1903, have, along with others, been pioneers in the study of hysteresis. These workers found that the hysteresis diminished as the number of cycles increased, and finally reached an approximately fixed value. The difference between the first two cycles was greater than that between any other two. Schwartz found, in 1910, that the area of the loop became fixed sooner in a high grade than in a low grade of rubber. He also found that when cycles were generated to a constant final load, the increasing extension at the

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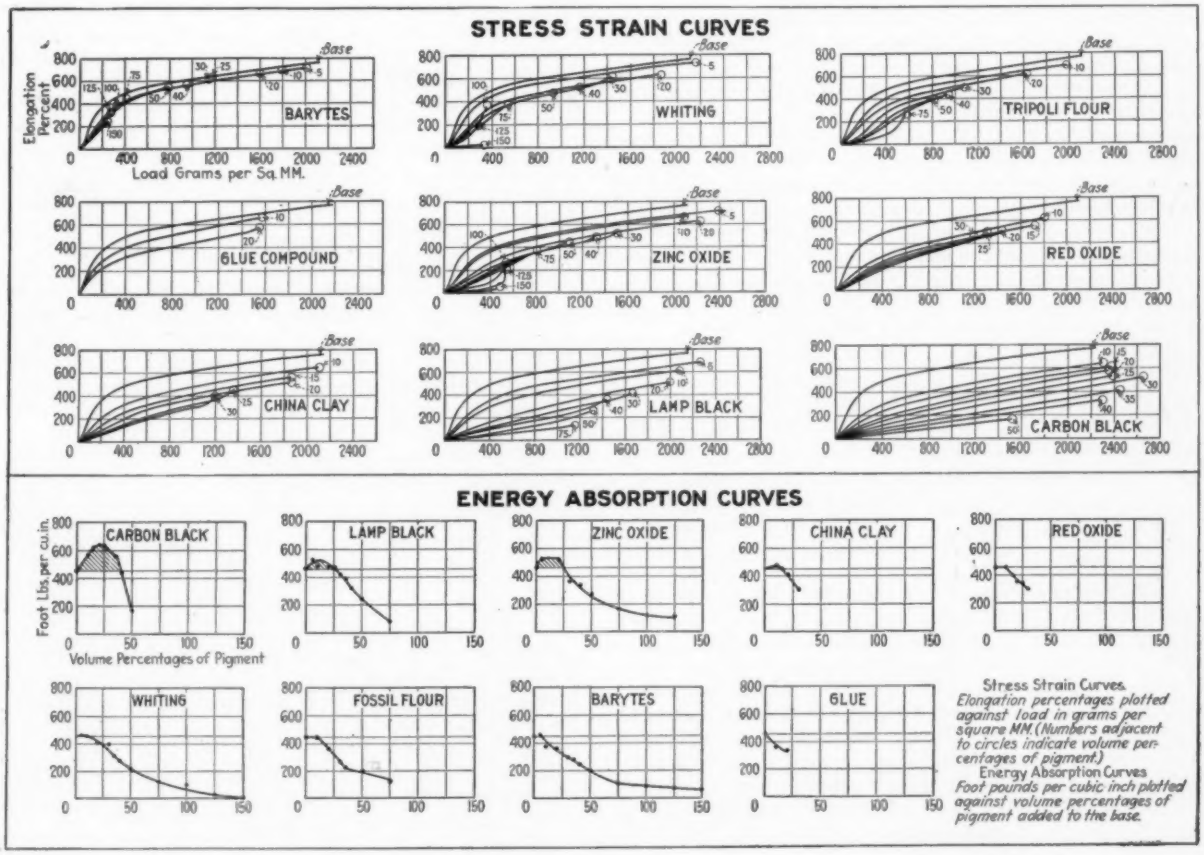
end of each cycle was proportional to the logarithm of the number of the cycle in question. Also, and naturally, these workers found that the shorter the extension the narrower was the hysteresis loop.

Another general rule laid down by Bouasse and confirmed by Schwartz is that the greater the speed of generation of the cycle the greater will be its area. You will at once appreciate the significance of this in regard to the internal heating of solid tires. Not only do excessive driving speeds multiply the number of hysteresis loops per second and, therefore also the heat liberated, but they also actually increase the calories of heat generated per revolution of the wheel.

One aspect of hysteresis is at least encouraging, namely, that the area of the loop diminishes with increased temperature. We may be thoroughly thankful that the converse is not the case. Solid tires and the breaker strips in pneumatic casings would go to pieces in no time if there were not this compensating law. Incidentally this temperature relationship strongly suggests the effect is now generally known as the Joule effect. Interestingly enough, the very first stages of extension are accompanied by a slight cooling effect. The corresponding cooling which accompanies retraction of the stretched rubber is definitely less than the heating effect on the extension. This difference representing the net increase in thermal content of the sample is the exact equivalent of the hysteresis loop, to which I have already referred. This heat must be attributed to internal friction in the rubber.

It may be of interest to compare the thermodynamical behavior of vulcanized rubber with that of better understood systems. Gases when expanded or compressed isothermally develop pronounced thermal effects. In fact, the energy expanded during compression, for example, is all turned into heat. Steel springs, on the other hand, are examples of systems which develop practically no thermal effects when deformed. All of the work done on the system appears as potential energy of strain.

Vulcanized rubber is intermediate between a gas and a steel



resemblance in many respects of rubber to a viscous liquid. In fact, Shedd and Ingersoll use the term "viscosity loop" rather than hysteresis loop for this reason.

THERMAL PHENOMENA

In the year 1805, Gough recorded in the memoirs of the Manchester Literary and Philosophical Society, that when he stretched a strip of rubber and held it to his lips it felt warmer than before stretching. Page, in 1847, made the same observation. Finally Joule also recorded the fact that while metals and other materials cooled on stretching, rubber, on the contrary, warmed. Lord Kelvin applied Le Chatelier's principle of equilibrium and predicted that if this was so, stretched rubber must contract on heating. Joule confirmed this by actual experiment, and the spring. When rubber is stretched the work done turns partly into potential energy of strain and partly into heat. In the case of an ideal rubber or compound (that is, one which shows complete reversibility), all of the heat liberated during extension will be reabsorbed during retraction and likewise all of the work done will be regenerated, thus leaving the sample in the same thermal as well as mechanical state as it was before stretching. Such a rubber would not heat up in a casing or solid tire any more than would a perfect gas, when alternately expanded and compressed. There would be no hysteresis. Actually, of course, the heat is not completely reabsorbed and the energy is correspondingly reduced. It is thus convenient to keep in mind the two thermal values involved in any cycle of extension

and retraction, namely, QR or reversible heat and QF or frictional heat, which is non-reversible and which accumulates when a rubber article is subjected to repeated strains.

The production of rubber compounds and cures for which QF is a minimum should be one of the focal researches for us all. The profound effect of mineral additions upon this quantity is already a part of technical knowledge. The fundamental reasons for this inter-relationship are deserving of our best thought. They lead us into the arcana of rubber structure.

INVERSION POINTS

In 1898 Lundal discovered that if a given load was applied to a rubber sample under gradually increasing temperatures, there was one temperature at which the addition of the load in question would cause no heating, and in fact above which it would produce cooling. Conversely at any given temperature he found that there was a critical load at which there would be no thermal effect. The lower the temperature the lower was the value of this critical load. Thus in a particular example raising the temperature from 18 degrees C. to 58 degrees C. increased the critical load from 44 to 102 grams.

The technical importance of these points of inversion in the Joule effect is manifestly very great. Suppose, for example, we could so adjust the thickness of the friction and skim coat between the plies of fabric in our casings as to bring the actual strains on the gum stock in actual service on the road to the critical point of inversion. Under such conditions there would be no thermal effect, no heating up of the stock, no perishing, no ply separation. Obviously it will be worth millions of dollars to our industry to conduct a successful research along the lines of determining the situation of these critical or neutral points as the state of cure and composition of the various mixings are systematically varied.[2]

TESTING CRUDE RUBBER

Reference is made to the method of Schidrowitz which will be found in detail in The India Rubber World, December 1, 1919, page 149. Briefly, Schidrowitz first notes that the stress-strain curves for the same mixing, but with advancing cures, come regularly down the paper and never intersect. The stiff parts of the curves are, moreover, parallel to each other.

Second, the inclination or slope of the final part of the curve is an index of the quality of the crude rubber under test. The flatter the curve, that is, the less the slope, the better the crude as ordinarily estimated.

Joule, Kelvin, Bouasse, Rontgen and the other master physicists were interested mainly in the correlation of the properties of rubber, as rubber, with those of other materials. We, on the other hand, are vitally interested in knowing how one rubber and one compound differs from another in its physical properties. Reference will therefore now be made to some of our own experiments designed to bring out the comparative behavior of a few of the more generally used inorganic compounding ingredients. These included carbon and lampblack, china clay, red oxide, zinc oxide, glue, whiting, fossil flour, and barytes.

BASIC MIXING

In order to avoid the tedium of doing a series of cures for each mixing, a base mix was developed containing,

	Parts by weight
Fine Para	100
Litharge	30
Sulphur	5

By volume this is:

	Volumes
Rubber	100
Litharge	3
Sulphur	2½

In this mixing the accelerator and sulphur are so balanced as to preserve a practically flat curing condition over a range of cure from 15 to 45 minutes at 40 pounds of steam. To this base mixing increasing amounts of each pigment were added on the volume basis. The additions were continued until the stock grew so dry and leathery on the mill as to be unworkable. The cures were made in an ordinary laboratory press and the test pieces stretched on a Scott machine.

BARYTES

Note the unchanged curvature of the base mixing curve. Increasing additions of this pigment have merely the effect of shortening the curve. Barytes is nothing but a diluent. It adds no useful property to any compound, but on the other hand detracts from both the tensile strength and elongation. For this very reason very large proportions (up to 150 volumes) could be incorporated into the hundred volumes of rubber before the stock became unmanageable.

FOSSIL FLOUR

This pigment shows signs of disturbing the basic stress-strain curve. There is less curvature. The curve has moved toward the "load" axis. A compound containing fossil flour is definitely stiffer than one containing barytes. However, after 30 volumes have been added there is no more rotation of the curve, which merely shortens, as in the case of barytes. The fossil flour particle is smaller than the barytes particle, and, in our opinion, the change in behavior after 30 volumes is most simply explained by assuming an agglomeration of the fossil flour particles, at this stage, into larger complexes, generating less rubber surface. The total quantity absorbed by the gum was in this case only 75 volumes.

WHITING

Here again the curve shows some displacement (stiffening) up to an addition of 20 volumes of the pigment. Thirty volumes adds nothing to the effect, and we assume that between these two volumes agglomeration has set in. The maximum absorption of pigment was in this case 125 volumes. Those who use more than 20 volumes of whiting in a compound must disclaim any beneficial effects on the physical properties.

GLUE

This was added in the jelly state. Up to 20 volumes there was a definite displacement of the curve indicating that glue is not a mere diluent, like barytes, but exerts a definite stiffening or toughening action in a compound. The tensile at break is, however, lowered.

ZINC OXIDE

This pigment shows a marked reinforcing or stiffening effect on the compound. The tensile strength at rupture is maintained undiminished up to a volume addition of 20 volumes.

Beyond this the curve recedes, as in the case of barytes. Agglomeration of particles has set in. Up to 20 volumes zinc improves wearing power. Beyond this it partakes more and more of the characteristics of a diluent. The best white treads contain not much more than 20 volumes of zinc to 100 of rubber.

The maximum absorption was in this case about 125 volumes.

RED OXIDE

This useful (and sometimes treacherous) pigment shows a reinforcing action up to 15 volumes. Beyond this is agglomeration. The tensile does not hold up so well as with zinc.

CHINA CLAY

China clay vies with zinc oxide as a re-inforcing agent. The rotation of the curve is even more marked than with zinc, although the breaking tensile is less well maintained. Twenty volumes again represents the maximum loading without detracting from the physical properties. Naturally, clays differ markedly according to their origin and colloidal condition. The above result must be regarded as only an individual finding.

LAMPBLACK

We now approach royalty in the pigment realm. Note the steady, clear-cut, downward progression of the curves toward

[2] For a discussion of the cause of Joule effect and many other matters, reference is made to a forthcoming volume by Professor G. S. Whilby of McGill University, Montreal, Canada.

the load axis, indicating greater and greater toughness. And yet the breaking tensile holds up splendidly. A stock containing 20 volumes of lampblack possesses stress-strain properties resembling in type those of steel and other rigid bodies; the curve is practically linear, that is, Hooke's Law applies. There is none of the usual flabbiness at low elongations. It is no wonder such a stock wears better as a tire tread than one made up even of zinc oxide or the finest grade of china clay.

Beyond 20 volumes, however, aggregation again supervenes and the pigment reverts to the barytes class.

CARBON BLACK

We come now to the king of pigments. The re-inforcing qualities of lampblack are here displayed in superlative degree. Instead of being diminished or at best maintained, the breaking tensile is markedly improved. Linear (Hooke's Law) stress-strain conditions begin early and continue unabated up to 40 volumes.

Particle aggregation, with resultant collapse of the reinforcing effect is postponed to 40 volumes, which is, of course, unapproached by any other pigment.

NUMERICAL MEASURE OF REINFORCING ACTION

The question now arose as to a suitable quantitative means of assessing the toughening effect of these various pigments on compounds containing them in varying amounts. One method consisted in measuring the rotation or displacement of the curve toward the load axis by simply taking the height (or elongation) at a definite load, say of 16,000 grams per square millimeter. The trouble with this method was, of course, that it took no account of the lowering of the tensile at rupture, which property varies greatly with different pigments.

The method finally chosen was developed by a consideration of the conditions governing the phenomenon of abrasive wear. Take for example an automobile casing tread. "Wear" here consists in the gouging or tearing out of small masses of gum, due to impact upon the road surface. Now a numerical measure of impact is the work done on each little mass of rubber. If this work can be stored up without stressing the rubber substance past its rupture point the mass will stay in place. The less energy it can so absorb, the easier it will be torn from its moorings.

Now the energy absorption is in each case represented by the area contained between the stress-strain curve and the elongation axis. This area was therefore measured by a planimeter and the results calculated to foot-pounds per cubic inch of original stock.

The curves in the graphs show the remarkable results obtained. Foot-pounds per cubic inch are plotted against volume percentages of pigment added to the base.

The base mix stored up 450 foot-pounds. The addition of barytes continuously diminished the energy content. Fossil flour, glue, whiting and red oxide all behave in essentially the same manner. China clay, however, is capable of slightly increasing the energy content. Zinc oxide and lampblack run neck and neck, showing marked increases. Carbon black is again the winner, and if not added in excess of 25 volumes may increase the energy content up to nearly 150 per cent of its original value.

SPECIFIC SURFACE

These facts point at once to the conclusion that the presence within the rubber matrix of a disperse phase, such as carbon black, which must be regarded as chemically inert, may nevertheless profoundly alter the characteristics of the system. The subjoined table indicates almost beyond a doubt that these effects run parallel with the specific surfaces developed by the various pigment phases.

The particle diameters here shown were determined microscopically and are of course only approximate, particularly in the case of the finer pigments. The surface developed per cubic inch of pigment was in each case calculated from the observed average diameter of the particles. The values range from 30,000 (barytes) to 2,000,000 (carbon black), and if, for simplicity, we assume that the adhesive force between the rubber substance and the pigment is the same in all classes, the enormous differences in the area of contact are alone sufficient to account for the striking differences in physical properties.

As a matter of fact zinc oxide increases the energy absorption of a compound to a greater degree than would be accounted for by its specific surface, and it is safe to assume that in this case there is also an exceptional surface tension behavior.

WORK OF H. F. SCHIPPEL

The fundamentally important work done by my colleague, Mr. Schippel[2], showed that, contrary to general assumptions, compounded rubber under strain undergoes relatively large volume increases which must be attributed to a separation of each pigment particle from its rubber matrix, doubtless forming a vacuum at each pole. He found increases, at, for example, 200 per cent elongation, ranging from 1.5 per cent for carbon black to over 13 per cent for barytes. The volume increases ran roughly parallel with the size of the pigment particles, zinc oxide again occupying an anomalous position.

Schippel's results throw a clear light on the mechanism of the reinforcing action of the finer pigments. These resist the increase of the free surface energy necessary to separate them from their rubber matrix. When a carbon black stock is stressed to rupture, the work done on the rubber phase must be increased by an amount representing the increase in surface energy required to separate each particle of carbon from its surrounding bed of rubber. In the case of a coarse pigment, such as barytes, this increase in surface energy is negligible.

The fact that with the finer pigments the rubber remains nearly uniformly anchored, instead of pulling free along the poles of each particle, must also result in a more uniform stress on the pure rubber phase and so contribute materially to the enhanced tensile properties and "energy capacity" of the compound.

Pigment.	Apparent Surface Sq.in per cu.in.	Displacement of Stress-strain Curve	Total Energy of Resilience Foot-pounds	Volume Increase @ 200% El. Percentage
Carbon black	1,905,000	42	640	1.46
Lamp black	1,524,000	41	480	1.76
China clay.....	304,800	38	405	...
Red oxide.....	152,400	29	355	1.9
Zinc oxide.....	152,400	25	530	0.8
Glue	152,400	23	344	...
Lithopone	101,600	..	...	...
Whiting	60,950	17	410	4.6
Fossil flour.....	50,800	14	365	3.5
Barytes	30,480	8	360	13.3
			Base 450	

In the above table are brought together for convenience the various properties already referred to, for mixings containing in each case 20 volumes of pigment.

Taken in conjunction with the well-known wearing properties of the various compounds, this table will bring out the fundamental casual connection between toughness or abrasive power, capacity for storing work, and bond between particle and rubber matrix; all three of these being, in the main, functions of the degree of dispersion of the rigid pigment phase.

One interesting deduction from this work is that perhaps the most direct and accurate way of determining the average fineness of an unknown pigment is to take its stress-strain curve in a standard mixing, measure its area with a planimeter, and compare the energy content with that of a known pigment. The application of this method to a glue compound gave a particle diameter, which was later confirmed by direct microscopic examination after staining.

[2] THE INDIA RUBBER WORLD, January 1, 1920.

STEAM REQUIREMENTS FOR VULCANIZING

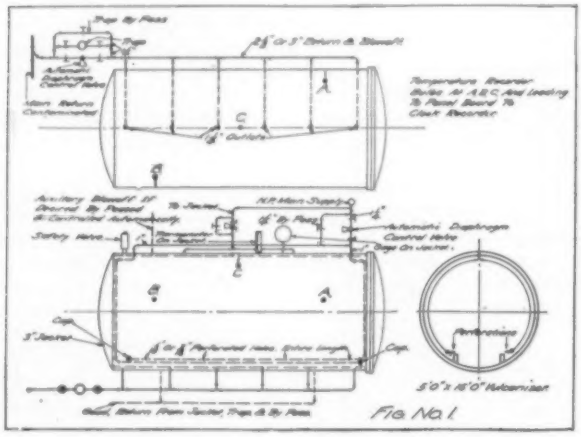
By Walter J. Bitterlich

THE most important requirements in vulcanizing rubber products are even temperatures. Different products require varying time durations of cure and some require a steady rise in temperature, whereas others require a quick rise and then a constant temperature. The steam distribution should be designed to meet the different requirements.

Engineers who are not familiar with vulcanizing processes believe that rubber plants are great wasters of steam; however, until there is a perfect trap on the market that will allow a steady instead of a fluctuating circulation, steam-traps will be by-passed that a continuous flow of steam may be obtained to insure even temperatures.

OPEN-CURE METHOD

In this method the steam comes in direct contact with the product and the cure is accomplished in a shell vulcanizer where pressures between 20 and 70 pounds are used, depending on goods to be vulcanized. The essentials for this method are dry steam, ample supply, and quick discharge. The former may be obtained by supplying boiler pressure up to 150 pounds, superheated at the boiler, directly to vulcanizer and reducing the



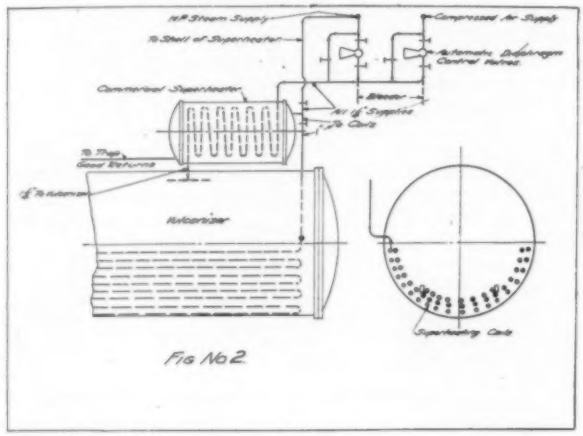
PIPING FOR 5 BY 16-FOOT JACKETED HEATER

pressure by means of a diaphragm valve close to vulcanizer. This has a superheating effect on the reduced pressure entering the vulcanizer, due to the high temperature of the higher pressure in the main supply.

A superheating effect of from 3 to 4 degrees F. is sufficient and if superheated steam of higher temperature is in the main supply pipe, its temperature cannot be controlled evenly by automatic vulcanizer control. To overcome this effectively it is necessary to install a saturator which is a commercial temperature control that automatically sprays water into the main steam supply, thereby lowering the steam temperature to within 3 to 4 degrees F. of its saturated value.

Should the steam be wet or condense as it enters the vulcanizer, the goods will be stained, causing a defective product. To avoid this the vulcanizer is warmed up first. This may be accomplished in several ways, namely: (1) by jacketing the shell vulcanizer and supplying it with steam at higher pressure. The jacket, however, is expensive in first cost but some goods cannot be cured otherwise with good results. The temperature of the steam should be about 10 degrees F. higher than the steam entering the vulcanizer; (2) by installing coils in the interior of the vulcanizer at bottom and sides and supplying steam at higher pressure; (3) by using compressed air, superheated to high temperatures; (4) by using a combination of two or all three of the above methods, depending on the quality of goods to be cured and quality of steam available.

Fig. 1 shows a typical piping system for a 5 by 16-foot jacketed

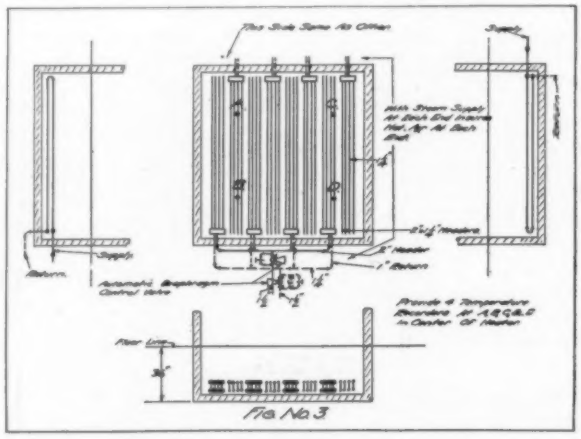


SUPERHEATING COILS AND HEATED COMPRESSED AIR SYSTEM

vulcanizer. Fig. 2 shows the warming-up feature with superheating coils and the heated compressed air system.

Referring to Fig. 1, the steam supplied through perforated pipes inside the heater near the bottom is to insure hot steam at the bottom. If the supply entered near the top the hot steam would remain near the top and the bottom would be lower in temperature. The total area of all the perforations should be at least 10 per cent less than the area of the pipe to create an equal velocity through each perforation.

The several bottom outlets serve two purposes, one of which is to drive out all the air which is heavier than steam and which if mixed with steam during vulcanization has a powerful oxidizing effect on the product. Particular care should be taken to locate the outlets as close to each end of the vulcanizer as possible as this is where the air is most likely to pocket. The other purpose is for quickly discharging the steam at the end of



TYPICAL SQUARE HEATER

the cure to prevent overcuring and to allow immediate removal of the goods.

In this respect the main return pipe should be amply large with no back-pressure valve on the exhaust riser. In pit vulcanizers for tires, overcuring is prevented by flooding the vul-

canizer with cold water at the end of the cure. A source of trouble encountered with return pipes is the eating away of the pipe, fittings and valves, due to the action of a weak solution of sulphurous acid formed after vulcanization from the

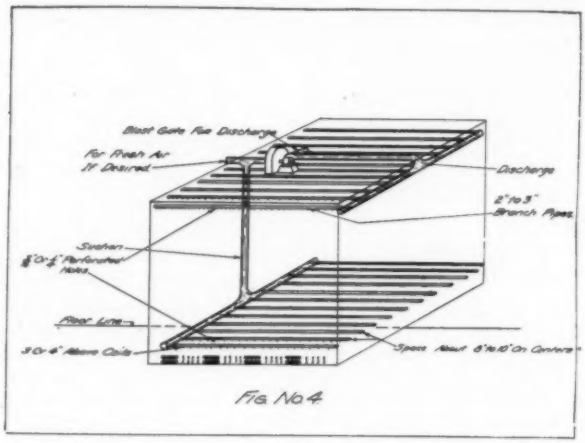


FIG. NO. 4

MECHANICAL AIR CIRCULATION

sulphur dioxide, the effect of which is worse than a strong solution.

Lead-lined pipes and fittings have been used but even they are attacked by the acid especially at the joints. Extra heavy cast-iron flanged or wrought-iron welded flanged pipe with extra heavy cast-iron flanged fittings will give best and longest service. Steel pipe should never be used. When monel metal diaphragm disks become pitted they may be replaced at considerably less expense with an alloy of 90 per cent aluminum and 10 per cent copper which gives equally good service.

A tremendous amount of steam goes to waste, owing to the fact that a steady circulation is required, and because an unobstructed exhaust is required. The only possible re-use may be obtained by the installation of a specially constructed water heater built of very heavy copper coils or tubes and cast iron shell, allowing free passage of the exhaust steam. Even this

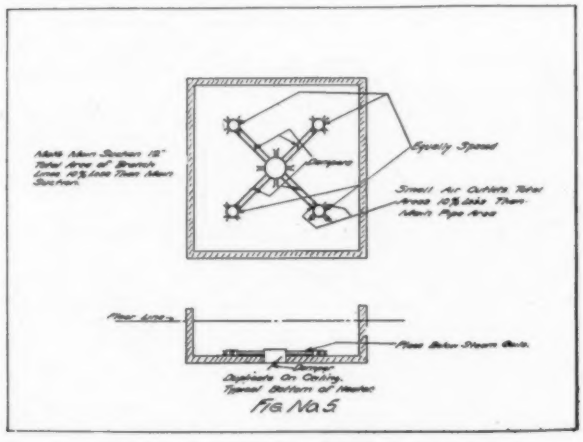


FIG. NO. 5

CIRCULATION WITHOUT MECHANICAL MEANS

cannot be guaranteed to withstand the acid fumes more than several years.

AUTOMATIC CONTROL AND THERMOMETER RECORDERS

The importance of automatic control of the steam supply and exhaust to maintain even temperature can hardly be overestimated and a liberal installation of thermometer recorders in different sections of the vulcanizer will be well repaid in the perfection of the product, if the steam supply and exhaust are regulated to make them record alike. This can best be accomplished by having a central control room with all recorders mounted on a panel in front of an operator who can control the diaphragm valves with aid of compressed-air needle valves. One operator can take care of two or more vulcanizers. The thermometer bulbs become pitted by the action of sulphurous acid and can be renewed by an alloy consisting of 75 per cent lead, 15 per cent antimony and 10 per cent tin.

CLOSED-CURE METHOD

In the closed-cure method the product is cured through the medium of air heated from the radiation of steam coils, and is accomplished in a box-type heater where no pressure occurs. They are usually built of the following materials: (1) wood, sheet iron, asbesto-cel and magnesia; (2) tile, sil-o-cel or burnt cork and magnesia; (3) structural sheet iron, asbesto-cel and magnesia. All depending on cost, insulating qualities, and fire hazard. No. 2 and 3 being the preferred class. Broken up air space gives the best insulating qualities and can be obtained with asbesto-cel.

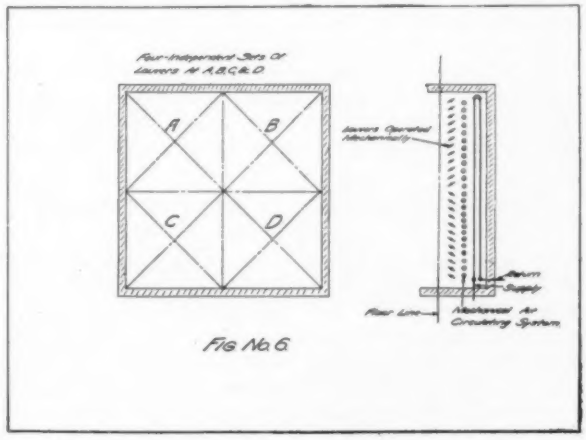


FIG. NO. 6

THE USE OF MECHANICALLY OPERATED SHUTTERS

Fig. 3 shows a typical heater absolutely square for better distribution of its piping arrangement. With good insulation a ratio of one square foot of pipe surface to five cubic feet of contents will produce temperatures up to 300 degrees F. with steam at 100 pounds pressure. The number of supplies is determined by size of the heater. A heater about 20 feet square should have at least four supplies, each of which should be controlled automatically by temperature control equipment.

Ideal vulcanizing conditions are obtained in absolutely still air with even temperatures but the latter cannot be accomplished in still air and therefore a minimum of circulation should be striven for in order to obtain even temperature throughout the heater. The following methods may be used for accomplishing this purpose: (1) use of a slow-moving paddle directly over the steam coils; (2) use of a blower with perforated galvanized iron pipes, drawing the hot air over the coils and discharging it at the top of the heater, as shown in Fig. 4. The capacity in cubic feet per minute of blower should be 25 per cent of the volume of the heater; (3) use of galvanized iron air ducts without mechanical means of circulation, as shown in Fig. 5; (4) use of shutters in combination with any one of the above methods as shown in Fig. 6. Automatic controls and temperature recorders should be provided liberally as mentioned under the open-cure method.

ELECTRICAL HEATERS

Experiments have been made in using electric current in place of steam for closed heaters, with good results. Its operating cost, however, with cost of current per K. W. and steam per boiler horsepower being equal is more than 100 per cent greater than the steam. Its advantages are as follows: (1) flexibility, allowing heaters to be placed anywhere in the plant requiring wiring only and no expensive steam mains and returns; (2) lower maintenance expense; (3) better control either hand or automatic. When current is cheaper it would not surprise the writer to see more electrical heaters used for the closed type.

For hydraulic presses steam is the better agent because of the ease in maintaining an even temperature in the platens. This is because of the fact that the cast iron platens are small and of uniform thickness and only require a steady circulation of steam at a given pressure.

VAPOR CURE HEATERS

Where goods are cured with acid fumes generated from air heated by steam coils, the temperatures are under 150 degrees F. and the same general design of closed-type heater can be followed but no mechanical means of air circulation is required because the heaters are generally built considerably smaller. Acid-resisting materials such as asbestos and magnesia should be used on the interior, and if any wood or metal is used it should be thoroughly painted with asphaltum.

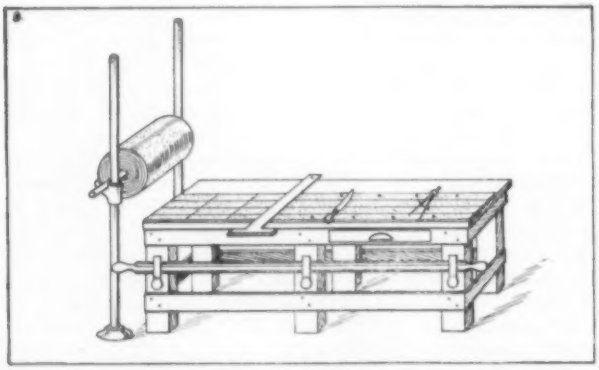
In conclusion it should be borne in mind that since all rubber goods must be cured the importance of vulcanization can hardly be overestimated, and time and money spent for its improvement to insure uniform product will be well repaid by increased orders.

THE MANUFACTURE OF DENTAL RUBBER

By Arthur C. Squires

The manufacture of dental rubber is a highly specialized branch of the rubber manufacturing industry. This material is supplied to the dental trade in unvulcanized sheets for the purpose of making individual dental plates. Dental rubber must be absolutely pure and free from all foreign matter. It should possess strength, light gravity, permanent color, the quality of packing easily in the vulcanizing molds, and cure in 55 minutes at a temperature of 320 degrees F. It must finally take a high polish.

A variety of colors are made for the dental trade including pink, maroon, orange, and jet black in plain and mottled finish.



Glass Top Cutting Table

Jet black dental rubber is the strongest and lightest in gravity. Dark orange is the strongest of the colored rubbers, and maroon comes next.

Pink dental rubber is used only as a facing to match the natural gums of the individual wearer. Owing to the amount of white pigment used in combination with other colors in producing a natural pink gum color, the strength of pink dental rubber is not equal to that of the lighter gravity rubbers. A plate would not be strong enough if made entirely of pink rubber and therefore it is utilized only in gum facings.

The following list shows the great variety of colors used in the dental trade:

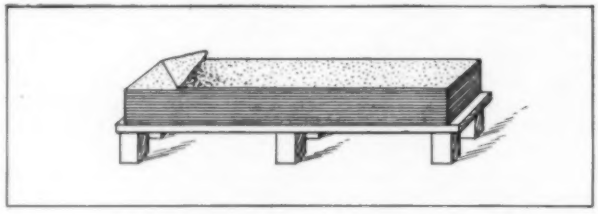
No.	Colors	No.	Colors
1.	Light orange	10.	Medium pink
2.	Medium orange	11.	Rose pink
3.	Dark orange	12.	Snow white
4.	Mottled light red	13.	Red palate
5.	Mottled dark red	14.	Black palate
6.	Plain maroon red	15.	Sunset orange
7.	Jet black	16.	Mottled maroon
8.	Coal black	17.	(1) Weighted
9.	Light pink	18.	(2) Weighted

Numbers 3, 6, 7, 9 and 17 dental rubbers are most used; however, the greater number of colors are made under special brands for the dental depots and sold exclusively by them.

As a matter of history it is interesting to note that prior to 1897, the Imperial Rubber Works of New York City imported a white vulcanite base to which color was added and milled at the works of this company. After many unsuccessful experiments the writer succeeded in producing a pink dental rubber, mention of which was made in The India Rubber World, January 1, 1897. Practically the same recipe is now used in this country in the manufacture of standard pink dental vulcanite.

The following is a brief description of the processes used in the manufacture of dental rubber:

Bolivian rubber is considered to be the strongest and best rubber for this purpose, and after a thorough washing on a



Sheet Stock Smoothing Table

cracker-washer, the thin sheets of rubber are then rewashed on a smooth-roll mixer equipped with water connections for constantly spraying the stock. During this operation the mill rolls are closed as tightly as possible, for the thinner the sheets the better the result. After washing, the thin sheets of raw gum are thoroughly dried in a vacuum drier.

The washed and dried rubber is then broken down on a regular mixing mill, this operation requiring at least three hours time, as the stock must be extremely soft before adding the compounding ingredients in order to insure their perfect distribution throughout the batch.

Two grades of sulphur are generally used in compounding dental rubber, ordinary flour of sulphur for all mottled vulcanite, and lac sulphur for plain colors, such as pink, maroon, light, medium and dark orange rubbers. There are three colors of specially manufactured vermilion, Nos. 2, 3, and G. O., which may be combined to produce certain required colors. In combining sulphur with vermilion it is necessary to sift the mixture in a rotary sifting machine.

Particular attention should be given to the mixing and milling operation which is performed on an ordinary two-roll mixer. The front roll should be coated with the soft, broken down stock, one to two inches thick. In adding the ingredients care must be taken not to allow the rubber to break or the surface of the rolls to be exposed. Nor should the compound be added to the batch faster than the soft milled rubber can absorb it.

The following typical dental rubber compounds, taken from "Crude Rubber and Compounding Ingredients," are interesting in

showing the various ingredients and the proportions used in practice.

DENTAL—LIGHT PINK

Fine Pará	16.0
Lithopone (green seal)	56.0
Lac sulphur	6.0
Lime	2.0
Pale vermilion	20.0
Ultramarine blue	Trace

DENTAL—BLACK PALATE

Fine Pará	77.0
Lac sulphur	15.0
Lampblack	4.0
Lime	4.0

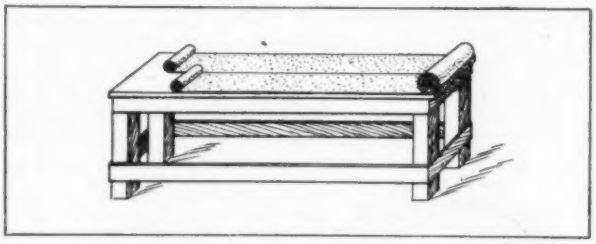
DENTAL—RED PALATE

Fine Pará	62.5
Lac sulphur	12.5
Dark vermilion	22.0
Lime	3.0

DENTAL—BLACK WEIGHTED

Fine Pará	20.5
Lac sulphur	15.5
Lime	1.0
Pure tin foil	61.5
Raw linseed oil	1.5

After the mixing operation is complete, the rubber is transferred to a refining mill, the rolls of which are set closely



METHOD OF EQUALLY DIVIDING GLAZED HOLLANDS BY TEARING

together and between which the rubber is passed seven times in order to attain the desired results.

Calendering dental rubber differs from ordinary practice in that absolute smoothness is not required in the soft calendered sheets, as they are piled on a special smoothing table where any unevenness is removed. Another difference is the use of glazed hollands, running 85 yards to the roll, on which the dental rubber is calendered. The selvage of the hollands is removed by tearing, and the width of the sheet divided, also by tearing, into equal widths of 18 or 20 inches. It is not practical to sheet dental rubber on full width goods.

The calendering operation consists in feeding the rubber stock in small quantities from the warming mill to the calender, the thickness of the calendered sheet being regulated by the adjustment between the center and top rolls, while the width is governed by two cutting knives. An average batch of dental rubber is 60 pounds.

As the sheet of hollands passes between the center and bottom rolls, the rubber sheet is laid continuously on the fabric by pressure of the middle roll, and wound up on the stock shell. As soon as possible after calendering, the roll is removed to the cutting room and eight-foot lengths are cut from it and piled one upon the other on the smoothing table where any unevenness in the sheets will disappear, due to the softness of the calendered stock.

This special table for cutting dental rubber is provided with a plate-glass top, 10 feet long, 18 inches wide, and ⅝-inch thick. A 10-foot straight-edge, a T-square, a cutting knife, and dividers complete the equipment. Two sheets of rubber are then removed from the smoothing table and placed rubber side down on the cutting table. The width and length of cuts to be made are laid off on the sheet with the dividers and the cutting is done with the hand knife guided by the straight-edge in the longitudinal cuts and the T-square in the cross-cuts.

When the two-ply sheet has been cut into the required sizes they are removed from the cutting table and a sheet of hollands is placed on the exposed rubber surface of each sheet for protection. The sheets of dental rubber are then stamped, weighed, boxed, and delivered to the shipping room.

DECLARED EXPORTS OF RUBBER TO THE UNITED STATES FROM Lisbon, Portugal, totaled $194,825 for the quarter ended June 30, 1920.

NEW RUBBERIZED AIRSHIP FABRICS

FABRICS for the gas envelopes of lighter-than-air craft usually consist of cotton cloth coated with rubber. The requirements are high strength, light weight, low diffusion, water resistance and durability. The most important of all is durability, and extended observations show that the intensity and time of exposure to sunlight varies the life of rubberized fabric to a great extent. Dirigibles operating off the Florida peninsula and using envelopes made with a fabric that a year ago was considered to be of standard quality have had a useful period of not over thirty days. At the end of that time replacement of gas is necessary, which reduces the operating period. Envelopes made of the same fabric and operated off waters adjacent to Long Island have shown an average useful life of fifty days before deflation was necessary.

The Manufacturers Aircraft Association has learned that a study of British and other foreign practice in fabric manufacture, combined with the results of extended exposure tests carried out under various climatic conditions with fabric made experimentally in this country, has led to the formulation and adoption of what are believed to be improved rubberized fabrics that withstand the sun's action.

The cloths that are used to the greatest extent are known as AA, BB and DD, respectively 2-ounce, 2.5-ounce and 4.5-ounce. All are of long-staple Sea Island, Egyptian or Arizona-Egyptian cotton, 40.5 inches wide when finished, with a tolerance of ½-inch. The other specifications follow:

Cloth AA.
Weight: 2.1 ounces, maximum per square yard.
Tensile strength: 30 pounds minimum for either the warp or filling finished.
Count: 118 threads minimum per inch either way, finished.

Cloth BB.
Weight: 2.65 ounces maximum per square yard, finished.
Tensile strength: 45 pounds minimum for either warp or filling, finished.
Count: 128 threads minimum per inch either way, finished.

Cloth DD.
Weight: 4.6 ounces maximum per square yard, finished.
Tensile strength: 65 pounds minimum for either warp or filling, finished.
Count: 95 threads minimum per inch in the warp and 105 threads minimum per inch in the filling finished.

After weaving, a careful inspection is made of the cloth, both before and after desizing and washing. All slubs and imperfect spots are marked so that they may be cut out before rubberizing. The cloth is then passed through spreaders which apply thin coats of Pará rubber solution containing only a very minor percentage of sulphur and litharge without the usual organic cure accelerators previously used. This thin rubber solution fills up the interstices of the weave. Much heavier rubber dough is then applied as the process proceeds.

After twenty to twenty-five coats are spread and dried, a continuous, gas-tight film is produced. High count cloth and heavy proofing give the minimum diffusion. For instance, with a 2-ply BB cloth having a gas film of 3½ to 4 ounces there is obtained very low diffusion. Added weights of proofing applied to higher count cloth would probably induce but slightly better results than are obtained with the above construction. Two plies of the treated cloth are stuck together by means of roll ply machines. The fabric is then wound on drums, wrapped and steam cured at carefully controlled temperatures, pressures and periods of time. Colored proofing is then added which, it is believed, constitutes an important factor in reducing the action of light. The exterior of the fabric is faced with an aluminum coat which acts as a continuous light reflecting coat.

The inner or gas side of the fabric is coated with one-half to one ounce of pure rubber per square yard which helps to keep the cloth moistureproof, reduces diffusion and makes a good sticking coat for successful taping. The tape is applied both to the exterior and interior.

REPLETE WITH INFORMATION FOR RUBBER MANUFACTURERS—H. C. Pearson's "Crude Rubber and Compounding Ingredients."

Toron Patents and Products[1]

ALL rubber manufacturers will be interested in securing the practical results claimed for the use of the patented sulphur-terpene compound known as Toron. Chief among these is the increase of strength imparted by the material to fiber and increased adhesion of friction to fabric treated with the material; also its ability to bond firmly together metal and rubber.

The nature and method of production of this material are quoted below from the patent application.

SULPHUR-TERPENE COMPOUNDS

It is possible to treat terpenes and certain of their derivatives with sulphur to produce useful sulphur-terpene compounds. When treatment is completed the product is a hard mass, soluble alone or with other substances, and useful for coating surfaces or impregnating and coating the fibers of absorbent materials. If the chemical reaction is moderated or stopped short of completion, the product is more or less viscous or semi-solid, and is available for use alone or in solution or in admixture with other materials.

PROCESS OF MAKING TORON

One process, by which this sulphur-terpene compound can be produced is thus described:

Equal parts by weight of oil of turpentine and sulphur are placed in a suitable converter, in the neck of which is fixed a condenser suitably arranged to pass back into the converter the products of condensation. An outlet is also provided for removal of the gases generated during the reaction without loss of the volatile constituents. The contents of the converter are heated to melt the sulphur. The reaction is well determined by the time a temperature of 150 degrees C. is reached.

During the ensuing period of one hour, the temperature is raised to 175 degrees C., the mass being agitated preferably with air, and, during the next two hours, the temperature is raised 12.5 degrees C. each hour, with lessened or no agitation. During the reaction, which appears to be progressive, the sulphur reacts with the turpentine, partly to combine with it and partly to set hydrogen free from the turpentine in the form of hydrogen sulphide. Also secondary reactions take place, resulting in removal of the sulphur introduced into the terpene residue with the hydrogen of the latter in the form of hydrogen sulphide, and the production of char. It is because of these facts that the temperature is moderated.

PROPERTIES OF THE PRODUCT

The product thus produced, when cooled to ordinary temperatures, is a hard, brittle mass resembling mineral rubber. It breaks with a fracture, showing curved surfaces presenting a glassy luster. When manipulated between the fingers the material becomes plastic. It is insoluble in water, partly soluble in acetone, soluble in turpentine with reaction, and soluble in toluol and xylol. When in solution it will pass through parchment and, according to this test, is non-colloidal.

Analysis has shown that certain of these hard sulphur-terpene compounds, produced from equal parts of sulphur and turpentine, as described, contain from 30 to 50 per cent of sulphur.

When the reaction has reached the stage when free sulphur is no longer present in the mass, the latter, on cooling, is a black, viscous liquid. During the reaction which follows that stage, if the heating is continued, the evolution of hydrogen sulphide continues, with increasing viscosity of the mass until charring occurs. The reaction therefore may be interrupted at will, and sulphur-terpene products of various characteristics and properties produced as desired.

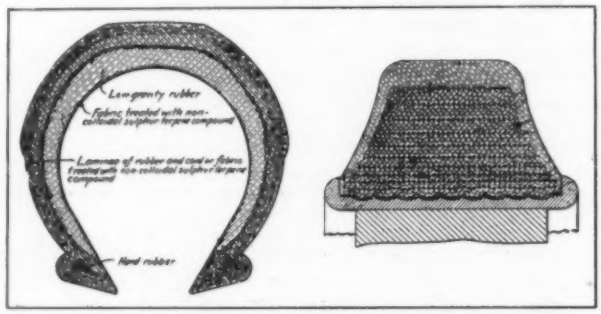
[1]United States patents Nos. 1,349,909 to 1,349,914, inclusive.

The semi-solid products produced may be employed for coating or impregnating various materials. For most practical purposes in order to provide a quick-drying coating or impregnating material it is found preferable to dissolve the hard compound in toluol, xylol or their equivalent. For many purposes other substances may be added to the solution, such as pigments and dissolved crude or vulcanized rubber.

APPLICATIONS OF TORON

The practical utility of a material possessing the properties exhibited by this product will be very important in the rubber industry. The practical applications are covered by a series of patents.

Referring briefly to the principal functions of this material in rubber goods manufacture, it has been found that cotton fabrics impregnated with this product are not only preserved from



SECTIONS OF TORON PNEUMATIC AND SOLID TIRES

deteriorations but gain very markedly in tensile strength. When such impregnated fabrics are friction-coated the penetration and adhesion of the rubber composition are much superior to those obtained without the chemical impregnation. This is due to the fact that the sulphur-terpene compound by vulcanization unites with rubber so that contiguous layers of rubber and fabric cannot be stripped apart at their juncture.

This feature constitutes a distinct advantage over present practice in the manufacture of every variety of rubber goods containing fabric such as tires, hose, belting, boots, shoes, etc.

As a bonding material to unite rubber to iron it is particularly effective for the manufacture of rubber-covered press rolls or solid tires. The metal is first surfaced with a solution of the sulphur-terpene material, upon which are built several plies of toronized, frictional fabric and the tread composition. The sulphur-terpene compound and the rubber-sulphur compound react and vulcanize together and bond solidly to the metal.

In explanation of the union of rubber to metal the theory is offered that the sulphur-terpene compound in contact with the iron, excludes the possibility of surface oxidation, and that the sulphur-terpene compound interacts with the iron to form a sulphur-iron compound, which not only furnishes a protective coating on the iron surface, but also acts as a bond between the iron and the sulphur-rubber compound.

SYRINGA VULCANINE

A new organic accelerator known as Syringa Vulcanine is being supplied to the rubber trade of Great Britain and continental countries by the English manufacturers. It is a special drug which enhances toughness and durability without decreasing the resiliency of the cured product. It has been proved of especial benefit in the manufacture of tire treads, rubber heels, etc. It is claimed also as an equalizer of vulcanization, requiring less sulphur and obtaining more uniform results.

What the Rubber Chemists Are Doing

INVESTIGATIONS ON DIFFERENT COAGULANTS

THE FOLLOWING SUMMARY of results is taken from the paper by Dr. O. de Vries, published in *Archief Voor de Rubbercultuur*, May, 1920.

SULPHURIC ACID

Sulphuric acid has been used on several estates during the war. It is a strong coagulant which partly or wholly replaces the anti-oxidant, sodium bisulphite. Small quantities used for coagulation do not give large deviations in properties of the rubber, but by the use of large quantities the rate of cure and viscosity of the rubber are markedly decreased and more rapidly than when corresponding amounts of acetic acid are used. Uniformity in rate of cure of the product is more difficult to preserve when using sulphuric acid as coagulant because variations in the amount used may always occur in practice.

Many manufacturers do not like the use of sulphuric acid, as they fear a harmful action of traces left in the rubber. Aging experiments have not shown this effect. The properties of the raw or vulcanized product, on aging, changed in exactly the same way as after acetic acid coagulation. The slow rate of cure caused by sulphuric acid changed more rapidly than with acetic, and the abnormal values recovered to normal ones, as if some retarding substance had gradually disappeared.

ALUM

Alum as a coagulant is very largely used by native planters. Coagulation proceeds best with undiluted latex, in which three to four grams per liter would be sufficient, while eight to 12 grams give rapid coagulation. Small quantities of alum cause a marked decrease in rate of cure and viscosity, while large doses, such as are often used to obtain rapid coagulation, give abnormally slow-curing rubber with a low viscosity. The tensile strength shows no marked deterioration, no greater than might be expected from the much longer time of cure. The slope of the stress-strain curve decreases somewhat by larger doses.

ACETIC ACID

Acetic acid obtained by wood distillation has the drawback that the tarry substances are difficult to remove completely, so that crêpe cannot be prepared with it and the color of the sheet becomes too dark. Acetic acid prepared by fermentation of alcohol is cheap and a good coagulant. Commercial acetic acid, if cheap enough, is preferred. The crude acid gives rubber of practically the same properties as the pure commercial acid.

FERMENTED COCONUT WATER

The juice from coconuts, on fermentation, gives an acid that proved satisfactory as a coagulant. Transport of this dilute acid fluid is too expensive, so that it can be used only on estates growing both rubber and coconuts. Large series of coagulation experiments proved that these acids gave rubber of exactly the same properties as commercial acetic acid, which are uniform over just as long periods.

ACID COFFEE JUICE

The acid juice obtained when fresh red coffee berries are allowed to ferment for some days in water was tried as a coagulant, but as it has a dark red color, crêpe cannot be prepared with it, and sheet also takes a darker red than usual. The properties of the rubber from some experiments seemed to be injured somewhat. This coagulant would be available only during the few months of the coffee harvest and is not likely to gain any importance except in emergencies.

CRATER LAKE ACID WATER

Acid water from a crater lake in the volcano Idjen in East Java was tried as a coagulant. It has a strong coagulating power, containing alum, sulphuric and hydrochloric acids. Its composition varies with the depth from which it is taken and, as might be expected, it proved injurious to the properties of the rubber, especially when used in large quantities. Aging tests on rubber coagulated by this acid crater water showed marked deterioration in tensile strength and viscosity.

ALCOHOL

Alcohol and denatured spirits were tried as coagulants. Coagulation is quite different from ordinary acid coagulation, as it is instantaneous. Where alcohol mixes with the latex it forms a clot and no further coagulation of the remaining latex occurs. Only strong alcohol and undiluted latex can be used, else the quantities of alcohol become much too large. The cost of this coagulant is ten times that of acetic acid even when using denatured spirits free from duty. Alcohol has some advantages for trial coagulations and experimental purposes, as it gives rapid and complete coagulation. Coagulation by alcohol was found to leave the rate of cure unchanged, while the slope of the stress-strain curve was always steeper and the viscosity mostly lower. The tensile strength remains unchanged or becomes somewhat less (by denatured spirit).

FORMIC ACID

Considering the price and coagulating power, formic acid might be a good substitute for acetic acid, but it seems to be irregular in composition, perhaps sometimes containing formaldehyde, and gives irregular results, notably sometimes a marked decrease in rate of cure.

LACTIC ACID

Lactic acid has no importance as a coagulant in practice, as it is too expensive. Since this acid is found in most fermentation processes and plays a rôle in spontaneous coagulation, and in different fermented saps, such as coconut water, some experiments were made with it. The properties of the rubber were found to be unaltered, except for a small decrease in rate of cure.

HYDROCHLORIC ACID

An experiment with hydrochloric acid showed that a strong dose retarded the cure very much, although somewhat less than an equivalent dose of sulphuric acid, while viscosity and tensile strength deteriorated markedly and the slope became somewhat better. After two years the sample became tacky and could not be vulcanized, while the viscosity decreased to a very low figure. The samples prepared with strong doses of acetic and sulphuric acid remained unchanged in appearance, though the viscosity decreased.

BLACKENING OF RED RUBBER TUBES[1]

The black spots which sometimes appear on the surface of rubber goods, and also the blackening of the interior during vulcanization, are most likely due to the interference of iron. This may be obviated to a great extent by taking special precautions to prevent the direct contact with either condensed water containing traces of iron in solution or suspension, or the sulphiding and subsequent reducing action of the iron surface of the mandrel acting on the red antimony in the red rubber goods. Probably the actual blackening is not caused directly by the formation of ferrous sulphide, but rather that the iron, in conjunction with the water vapor present, tends to act in such a way as to form a temporary solution of a small part of the antimony. This results in the ultimate reprecipitation of the antimony sulphide in the black variety on the part affected.

[1]From The Rubber Age, London, June, 1920, page 152.

Regarding the condition wherein the complete blackening of the whole mass of rubber occurs, this may be due to the composition of the rubber mixing (which should not contain accelerators that have as the principal part of their composition alkali hydroxide or sulphide), as these would act on the antimony in a similar way to the iron salts mentioned, causing solution and subsequent precipitation of the antimony as black sulphides. It should be possible with a good antimony and the right kind of iron oxide (if it is desired to use these two pigments in conjunction) to produce a good red tube, although not of as light a color as with antimony alone. In cases, therefore, where these two materials are used in conjunction, and where blackening has occurred, a blank should be tried out, using the antimony alone. It will be generally found, if the vulcanizing conditions are comparable to that of bulk, that the antimony is at fault because of its instability under the vulcanizing conditions.

Where crimson antimony has been found to be unstable, if a little magnesium oxide is added to the mixing and it is cured in a mold, the antimony color is preserved in its rich bright shade.

Similarly, when the same mixing is cured in open steam, the outside only becomes darkened. This varies from brown to coal black, according to the excess of magnesium oxide used and with the degree of instability of the antimony, while under the surface the color will be found equal in shade to that of the press-cured result. It has been demonstrated that a good red color for open steam articles with an unstable antimony may be obtained if care is taken to determine by trial the exact amount of magnesium oxide to use in the mixing rather than to use an excess.

With regard to the suggestion that red iron oxides are prone under vulcanization to blacken with the formation of ferrous sulphide, our experience is that those oxides of brick red, consisting chiefly of Fe_2O_3, do not change color except for a slight darkening toward a chocolate shade on the surface of open steam cured goods, while the purple oxides and brown umbers keep their color with very little change. In colored rubber work generally, it should be borne in mind that open steam cured results must not be confounded with the results obtained from molded or press-cured, as the conditions are entirely different as regards the effect on the pigments used in the mixings.

The cause of the antimony blackening when cured either with or without the admixture of iron oxides does not seem to arise from the small trace of acid that is generally present in the antimony pigment, though anything in the nature of a real acid excess would tend to have a blackening effect, as explained in the previous cases, by the ultimate solution and reprecipitation of a small part of the antimony. Even with a mixing wherein an acid substitute was used, this would practically be neutralized by such materials as whiting, magnesium carbonate, lime, or calcined magnesia that are generally present in such mixings where white substitutes are used.

It must be remembered that it is the nature of all red sulphides of antimony to revert to the black tri-sulphide when subjected to sufficient heat. In the inert atmosphere of a gas such as carbon dioxide, the temperature at which such blackening is complete is 155 degrees C., the change of color at this temperature being practically spontaneous. Longer periods at lower temperatures (145-150 degrees C.) will ultimately produce the same effect. It is therefore advisable to cure red goods at as low a temperature as possible if the best results as regards color are desired. In this connection it is well to point out that although an antimony may be found to blacken when heated alone in steam at the temperature to which it is to be subjected during the ultimate vulcanization when compounded, it does not necessarily follow that it will give bad results, because it has been proved in practice that the rubber acts to a large degree as a protective coating to the red antimony particles and so prevents the discoloration taking place.

In conclusion, to prevent the blackening of all red goods containing antimony, (1) see that the mixing is correct, (2) select the quality of the materials in direct regard to the specific purpose for which they are intended, (3) make trial mixings compounded and cured under conditions comparable to those used in the factory.

PERMEABILITY OF RUBBER TO GASES[1]

By J. D. Edwards[2] and S. F. Pickering[3]

THEORY OF PERMEABILITY

One object of this investigation was to establish, if possible, a quantitative relationship between the permeability of a film of rubber to any particular gas and the various factors on which it is dependent. Only a portion of the program was completed, however, before it became necessary to discontinue the work.

A simple and satisfactory picture of the process is one of dynamic equilibrium in which the gas is dissolved at one side of the rubber at a rate proportional to its solubility and partial pressure, and diffuses through the rubber where it evaporates from the other side. The same process takes place in the opposite direction so that the net transference of gas is proportional to the difference in the partial pressures at the two faces of the rubber. Because of the lack of data it is not feasible to analyze the relations between solubility and rate of diffusion through the rubber. The permeability in every case investigated increases rapidly with increase of temperature. According to Kayser[4] the solubility of both carbon dioxide and hydrogen decreases with increase of temperature. If this be true there must be a rapid decrease in the internal resistance of the rubber to the passage of the gas, because the ordinary temperature coefficient of gaseous diffusion is unable alone to account for the facts.

A rough parallel, with notable exceptions, may be drawn between the permeability of rubber to different gases and to the boiling points of the gases. In general, the higher the boiling point of the gas the greater the rate at which it penetrates rubber. The specific chemical characteristics of the gas and of the rubber colloid determine, however, the solubility, rate of penetration, etc., and not enough is known of them at the present time to warrant further speculation. There are, however, many interesting fields of investigation opened by this work, and the results should be extremely useful in the many cases where the behavior of rubber in contact with gases is concerned.

SUMMARY

1. The permeability of rubber compounds varies with the composition as would be expected. The aging of rubber films is accompanied by a decrease in permeability; a similar decrease may be effected by overvulcanization. The rubber, which shows a very low permeability for these reasons, is usually very much deteriorated and frequently brittle, so that it is a disadvantage from the standpoint of gas-tightness.

2. The permeability to any gas is found to be directly proportional to its partial pressure provided the total pressure is constant. The variation of permeability with total pressure depends on the thickness of the rubber, the way in which it is supported, etc.

3. The permeability to hydrogen is inversely proportional to the thickness of the rubber. No other gas was tested in this respect.

4. The specific permeability to hydrogen at 25 degrees C. of vulcanized rubber similar to the grade known as dental dam is about 20×10^{-6} cc. per minute. This value varies somewhat with the age and chemical characteristics of the rubber.

5. The temperature coefficient of permeability is quite high. For example, in the tests at 100 degrees C. the permeability to

[1] Condensation of a comprehensive report to be issued by the United States Bureau of Standards.

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[3] Associate Chemist, United States Bureau of Standards.

[4] Wied. Ann., volume 43, page 544, 1891.

carbon dioxide or helium was about seventeen times the rate at 0 degrees C. The permeability to hydrogen was about twenty-two times as great at 100 degrees as at 0 degrees C.

6. The relative permeability of rubber to some common gases is shown in the following summary:

Gas	Relative Permeability Hydrogen = 1
Nitrogen	0.16
Air	0.22
Argon	0.26
Oxygen	0.45
Helium	0.65
Hydrogen	1.00
Carbon dioxide	2.9
Ammonia	8.0
Methyl chloride	18.5
Ethyl chloride	200.0

7. The permeability of rubber to water vapor is high—approximately fifty times the permeability to hydrogen. This value, not having been determined with any precision, is not included in the table above.

METHODS OF ANALYSIS

THE DETECTION OF NATURAL BARYTES IN LITHOPONE, ETC.

THE FOLLOWING METHOD has been in use for 22 years in the laboratory of Michael Nairn & Co., Limited, Kirkcaldy, Scotland. It is given as reported by S. Stewart, F. I. C., in the *Journal of the Society of Chemical Industry*, July 15, 1920, page 188T.

Lithopone, Orr's zinc white, and other pigments composed essentially of zinc sulphide and barium sulphate should contain the latter only in the precipitated form. Inferior qualities sometimes contain natural barytes, to the detriment of their covering power, owing to the large size of the particles of barytes as contrasted with those of the precipitated sulphate. Its opacity is less, and although, when used as an ingredient in ordinary paints, this is perhaps of secondary importance, it becomes a matter of serious consideration when used for some other purposes; for example, in making white inlaid linoleum the use of lithopone containing natural barytes leads to the production of a yellowish white.

The microscope affords a convenient means for differentiating between natural and precipitated barium sulphate. The test is carried out as follows: A minute portion of the sample is spread on a microscope slide with a drop of water, dried, and examined with a ¼-inch or ⅙-inch objective, the diaphragm being closed so as to give a dark background. If only precipitated barium sulphate be present, it appears as a very fine powder composed of minute crystals of uniform size, whereas if there is an admixture of natural barytes, even when very finely ground, transparent irregular pieces of greater size will appear. The certainty of the method is enhanced if the zinc sulphide present in the lithopone be first removed by treatment with dilute hydrochloric acid and potassium chlorate and the insoluble residue examined as above.

TECHNICAL ANALYSIS OF LITHOPONE[1]

TOTAL ZINC AS ZINC SULPHIDE

Weigh two grams of lithopone into 600 cc. beaker, add a little water to moisten, and then 20 cc. 1-1 hydrochloric acid. Take to dryness on steam plate, take up in 75 cc. of water, add five cc. of concentrated hydrochloric acid, and seven grams of ammonium chloride, dilute to 350 cc. with hot water, heat to 180 degrees F. on steam plate and titrate slowly with potassium ferrocyanide, one cc. of which equals 0.01 gram of zinc, using uranium acetate as external indicator.

[1] J. A. Wyler in the Chemist-Analyst.

ZINC OXIDE

Weigh 20 grams lithopone into 400-cc. beaker, add 100 cc. of five per cent acetic acid and let stand on the steam plate for two hours, with occasional stirring. Filter into 600 cc. beaker, wash with water, boil to small volume, transfer to porcelain dish and evaporate to dryness. Add 20 cc. 1-1 hydrochloric acid and evaporate again. Take up in water, add five cc. concentrated hydrochloric acid and seven grams ammonium chloride, dilute to 350 cc., heat to 180 degrees F. and titrate with potassium ferrocyanide. Calculate to zinc oxide.

ACTUAL ZINC SULPHIDE

From the total zinc substract the zinc found as zinc oxide and calculate difference to zinc sulphide. Total barium as barium sulphate.

Weigh three grams sample into 250 cc. pyrex beaker, add ten cc. water and ten cc. concentrated hydrochloric acid. Take to dryness on steam plate, add 75 cc. water, few drops methyl orange and if not acid add a few drops hydrochloric acid. Boil, filter and wash. Return filter plus precipitate to original beaker, add ten cc. water and five cc. nitric acid. Take to dryness on steam bath, add 30 cc. concentrated sulphuric acid and fume strongly. In case acid is dark in color add crystals of potassium nitrate until colorless. Fume until only a trace of insoluble matter (silica) remains. Cool, dilute to 200 cc., boil, let stand in warm place to settle, filter, wash, ignite and weigh as barium sulphate. Calculate to percentage barium sulphate.

WATER SOLUBLE SALTS

Ten grams lithopone are weighed off into a covered 400-cc. beaker, 200 cc. water added, mixture stirred and heated on the steam bath for one to two hours to effect solution of soluble salts. Filter on four-inch Buchner, wash with hot water and evaporate filtrate in porcelain dish. When down to 50 cc. filter through a blue ribbon paper and wash with water. Receive filtrate in a weighed platinum dish, evaporate to dryness on steam bath and then dry at 110 degrees C. for one-half hour. Cool, desiccate and weigh.

IRON

Weigh 20 grams into 400-cc. beaker and moisten with about 15 cc. of water, then add 50 cc. concentrated hydrochloric acid slowly and with stirring. Let it stand over night, filter, wash with hot water containing hydrochloric acid, oxidize the filtrate with bromine and precipitate the iron by using a slight excess of ammonia water and allowing to settle several hours. Filter, dissolve and reprecipitate the iron three times. The iron precipitate is now ignited and weighed as ferric oxide.

MANGANESE

Boil five grams lithopone with 50 cc. 1-1 nitric acid, filter, wash and dilute filtrate to 150 cc. with cold water. Then add a little sodium bismuthate and allow to stand in the cold for twenty minutes. Filter through asbestos pad and compare with standards.

CHEMICAL PATENTS

THE UNITED STATES

SPONGE RUBBER. Articles such as balls having cells therein, largest at the central portion of the article and decreasing in size toward the surface of the article, may be formed from a mixture of rubber 70, sulphur 6, ammonium carbonate 8, zinc oxide 12, and magnesium oxide 4 parts. (James B. Wishart, Trenton, New Jersey, United States patent No. 1,345,904.)

SULPHUR-TERPENE COMPOUND. A sulphur compound which exhibits the following characteristics; neutral, amorphous, non-colloidal, insoluble in water, soluble in toluol and xylol and capable of reacting with rubber. (William Beach Pratt, Wellesley, Massachusetts, assignor to E. H. Clapp Rubber Co., Boston, Massachusetts, United States patent No. 1,349,909.)

Waterproofed Fabric consisting of a fibrous foundation impregnated with a non-colloidal sulphur-terpene compound. (William Beach Pratt, Wellesley, Mass., assignor to E. H. Clapp Rubber Co., Boston, Massachusetts. United States patent No. 1,349,310.)

Vulcanized Article and Process. A new manufacture comprising a fibrous body, and a non-colloidal sulphur-terpene compound bonding the rubber and fibrous body, all vulcanized together. (William Beach Pratt, Wellesley, Massachusetts, assignor to E. H. Clapp Rubber Co., Boston, Massachusetts. United States patent No. 1,349,911.)

Article and Process of Bonding Metal and Vulcanized rubber which comprises coating the surface of the metal with a non-colloidal sulphur-terpene compound, placing thereagainst a material to be bonded to such surface, and subjecting the structure to heat and pressure. (William Beach Pratt, Wellesley, Massachusetts, assignor to E. H. Clapp Rubber Co., Boston, Massachusetts. United States patent No. 1,349,912.)

Pneumatic Tire and Process which consists in treating a fibrous material with a non-colloidal sulphur-terpene compound, forming the tire structure of rubber and the treated fibrous material, and vulcanizing said structure. (William Beach Pratt, Wellesley, Massachusetts, assignor to E. H. Clapp Rubber Co., Boston, Massachusetts. United States patent No. 1,349,913.)

Solid Tire and Method of Manufacture. A tire comprising a rim, a solid rubber tread, and a layer of non-colloidal sulphur-terpene compound uniting the tread to the rim. (William Beach Pratt, Wellesley, Massachusetts, assignor to E. H. Clapp Rubber Co., Boston, Massachusetts. United States patent No. 1,349,914.)

Process for Vulcanizing Rubber which comprises applying an inert gas as a vulcanizing medium to a vulcanizable plastic material in a chamber communicating with the atmosphere and vulcanizing the plastic material by said inert gas while preventing the passage of air into the chamber by a counter-passage of gas. (Willis A. Gibbons, Flushing, New York., assignor to American Rubber Co., Boston, Massachusetts. United States patent No. 1,350,798.)

Process for Vulcanizing Rubber comprising the addition of a small quantity of a concentrated solution of a caustic alkali. (Edwin E. A. G. Meyer, assignor to Morgan & Wright, both of Detroit, Michigan. United States patent No. 1,350,824.)

Tire Filler and Method of Manufacture, consisting of the following ingredients in the proportions stated; 152 pounds sunflower seed oil, 32 pounds of sulphur chloride; 5 pounds of calcium hydroxide, 4 ounces of soluble dyes, and 8 pounds of soap oil. (Franc D. Mayer, Chicago, Illinois. United States patent No. 1,351,670.)

THE UNITED KINGDOM

Varnish, Adhesive, and Waterproofing. A composition for waterproofing of all kinds, and fabrics which may also be used as an adhesive, comprises the following preparation: dissolve 20 parts of caoutchouc and 60 parts of cellulose acetate in 60 parts of tetrachlorethane. Sulphur may be incorporated in the mixture to enable the coating to be vulcanized either by steam or hot air, or cold, by means of chloride of sulphur. Other substances may be added, such as organic or inorganic loading or coloring materials, and a softening agent for the cellulose acetate. (Etablissements Hutchinson, 124 Avenue des Champs Elysées, Paris. British patent 129,630.)

Recovery of Volatile Solvents. In recovering volatile solvents evaporating during the drying of india rubber articles and the like, an absorption agent is placed in the drying chamber, and uniformly distributed over it. The agent is preferably made to flow through the chamber, and may be conducted by means of rods, threads, wires, textile fabrics. The solvent is subsequently recovered by distillation or other means. (H. Schmidt, Cologne, Germany. British patent No. 141,739.)

Process for Rubber Boot and Shoe Manufacture. "Ammonia powder" is placed inside a cloth bag coated with gum arabic and shaped like a shoe. A rubber bag of similar shape is coated internally with gum arabic and the first bag inserted therein. The two bags are sealed and placed in a shoe-shaped metal mold which is then heated, when gas generated from the powder by the heat causes the rubber and cloth to adhere and take the shape of the mold. After removal from the mold an opening is cut for the introduction of the foot. (Y. Ose, 1 Majima-Cho, Shitayu-ku, Tokio, Japan. British patent No. 142,801.)

Treating Bark from Rubber Trees. Bark shavings are ground and masticated between rollers heated to about 275 degrees F., so as to knead the rubber with the bark and convert the whole into a plastic mass. The product, after mixture with a vulcanizing agent and vulcanization, is suitable for the manufacture of tapping-cups, coagulating-dishes, floor matting, etc. If the vulcanizing agent be added prior to grinding, the raw material may be treated in a scrap washer and creping machine as for the extraction of raw rubber. (R. T. Smith, 89 Chancery Lane, London. British patent No. 142,946.)

India Rubber Composition. In compositions containing a large proportion of caoutchouc, one or more of the compounding ingredients is or are dispersed through a carrier liquid before compounding, and the liquid removed before vulcanization. The liquid must be volatilizable and is preferably water. The compounding ingredients may be dissolved, or in colloidal solution, or suspended in the liquid. Suitable ingredients for compounding are sugar, glue, aluminum hydroxide, and barium sulphate. A protective colloid such as glue may be added to maintain a solid ingredient in dispersion. (H. Wade, 111 Hatton Garden, London. [The Goodyear Tire & Rubber Co., Akron, Ohio, U. S. A.] British patent No. 143,610. Same as United States patent No. 1,301,639.)

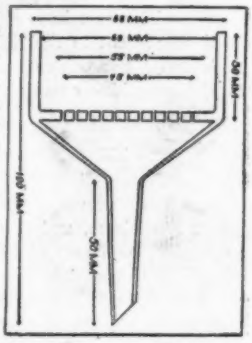
Wheel Tires. Air tubes for tires are reinforced by fabric impregnated with a solution of Turkish birdlime. A lining of Turkish birdlime may be applied to the inner surface of the tube. (C. W. Bradley, 107, Kenilworth Court, Putney, London, England. British patent No. 144,102.)

Heavy Composition to enhance the flight of golf balls consists of a non-rigid and elastic composition either of rubber or a gelatinous compound loaded with litharge, a chemical compound, or powdered heavy metal. In weight the material is from 20 to 40 per cent of the weight of the whole ball. (R. F. Hutchison and W. Patton, Murano Works, Albert Street, Edinburgh. British patent No. 144,126.)

LABORATORY APPARATUS

IMPROVED BUCHNER FUNNELS

An improved and standardized Buchner funnel is shown in the illustration which embodies the suggestions of numerous chemists. Standardization has been effected in the distance of plate from rim, filter paper from inside wall of funnel, and perforated area from edge of filter paper. The result is that funnels may be obtained in which standard filter papers will fit without unnecessary folding or loss of time in cutting.



Coors Porcelain Funnel

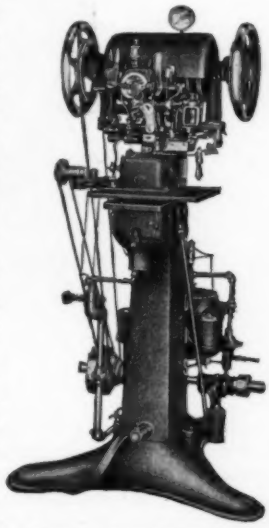
Filter papers may be made to fit this form of funnel by shaping them around a wooden disk, which will secure very quick filtration of precipitates for quantitative work and their efficient washing. (The Herold China & Pottery Co., Golden, Colorado.)

New Machines and Appliances

COMPOSITION SOLE STITCHING MACHINE

Attaching composition soles to leather shoes by sewing has become the general practice in this country and has resulted in the successful adaptation of leather sole stitching machines for this purpose in the shoe factory and repair shop.

A machine of this type, shown herewith, possesses a stitch adjustment from 12 to three and one-half inches per stitch. The heating system is self-contained, being attached directly to the pedestal of the machine. It operates with a small quantity of water and at a steam pressure of not over five pounds. All parts of the machine may be brought to the desired heat at the same time, and in the proper condition for sewing in 25 minutes. The take-up and thread-measuring mechanism are completely inclosed, thereby preventing the thread from exposure to cold air and becoming cold and stiff, and which results in thread economy. The wax pot holds a small quantity to insure fresh wax, while the galvanized pot and attached parts, and the copper steam coil, prevent the wax from being discolored. The complete machine is only furnished on a power stand. The heating may be accomplished with gas, gasoline or electricity. (Landis Machine Co., St. Louis, Missouri.)



Landis Sole Stitcher

THE G-R STRAINER

Strainers are required on the suction and discharge lines of lubricating oil, fuel oil and quenching oil systems, for the removal of solid foreign material in suspension. Also power plants which secure their water supply from such sources as rivers or lakes, require strainers to prevent weeds, sticks, marine plants and small fish from entering pipe lines.

Single Strainer

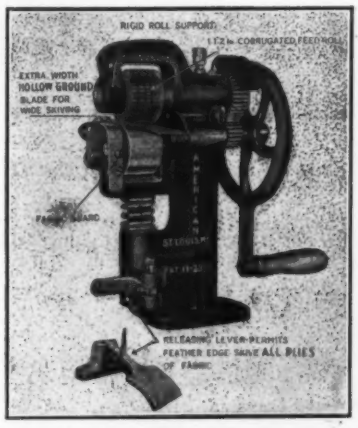
For this purpose the strainer shown in the accompanying illustration is recommended to rubber plant engineers. The body is constructed of cast iron and the strainer basket of perforated sheet steel and lined with wire mesh when strainer is to be used on an oil line.

This strainer is of the single type and may be installed either as a single unit or as the G-R strainer set. This set consists of two of these strainers connected, complete, including two three-way valves and necessary connecting elbows, unions and nipple. This set permits the cleaning of either of the two units without interruption of the service. (The Griscom-Russell Co., 90 West street, New York City.)

A NEW FABRIC-SKIVING MACHINE

A new fabric-skiving machine that finds ready utility in tire rebuilding and repairing is shown in the accompanying illustration. It is particularly adaptable for skiving down the plies of pulled fabric in making reliners, blow-out patches, and in general repair work.

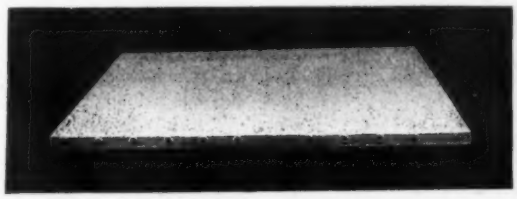
The makers claim that the machine will do the work in one-tenth of the time required in hand work, and that it will skive two-ply reliners successfully. The machine is adjustable to skive up to five-ply fabric. (R. T. Sales Co., Green Bay, Wisconsin.)



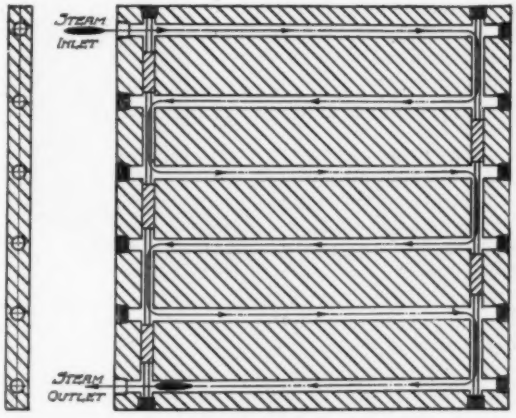
Wide Blade Fabric Skiver

STEEL PLATENS FOR HYDRAULIC PRESSES

An innovation in the construction of vulcanizing presses is the substitution of rolled steel steam platens for those of cast iron. The steel platens are made from the best grade of rolled steel boiler plate and the surfaces are planed, polished, drilled and connected for steam circulation. The advantages claimed over their cast-iron prototype are: better finish because of hard, smooth surfaces; saving of time by reason of quicker heating and chilling; saving of steam on account of greatly reduced



Rolled Steel Platen



Sectional View

radiation surfaces of the platen edges; greater comfort for the workers because of less heat in the curing room; saving of space, as generally twice as many steel platens as cast iron can be installed in the same press. The thickness of the steel platen is usually 1½ inches as against 4½ inches of the cast iron; doubling of output on the same number of presses; greater durability. The steel platen is practically indestructible. It will not crack nor explode from alternate heating and chilling. The greater hardness of the surfaces prevents pitting. (Southwark Foundry & Machine Co., Philadelphia, Pennsylvania.)

NAPHTHA AND CEMENT BENCH CANS

A novel type of cement can and an improved dispensing can for inflammable liquids are among the most interesting of the new products supplied to the rubber trade and especially to rubber footwear manufacturers.

Cement Bench Can

The cement can is made on up-to-date non-explosive lines. It has a shut-off gate which regulates the flow. The supply trough is fitted with a spring-closed cover. It is filled through the opening at the top over which is fitted a removable cover. This opening is large enough to make cleaning easy. The fusible latch which closes the cover when it melts prevents explosion and confines the fire to one spot. The can cannot explode and scatter burning cement over a large area. It is made in one size only, holding approximately one-half gallon.

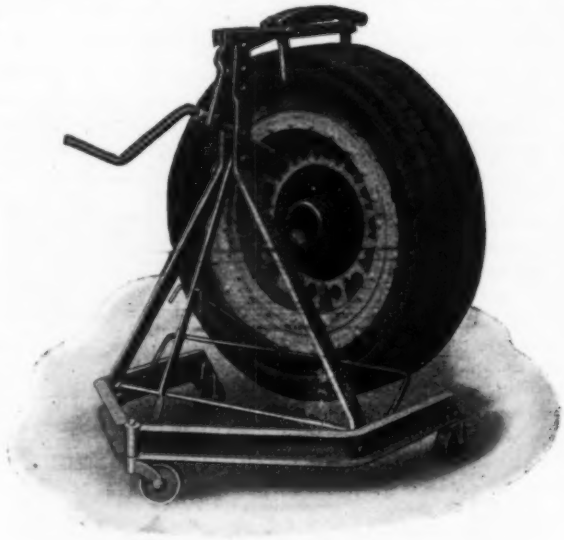
The improved naphtha dispensing can is designed for the safe and economical use of inflammable liquids, and its construction is such that in case of fire its contents will blow off and burn slowly rather than explode and scatter.

It consists of a large, air-tight chamber or reservoir which is connected with an open, spring-pressed cup by means of a spout and a ball valve. A slight pressure on the cup allows the ball to drop from its seat and the liquid flows freely into the open cup which, when released, reseats the ball, thus stopping the flow. The vacuum principle controls the feed, and makes overflow impossible. All necessary parts are manufactured of non-corrosive metal. The rest is cast iron. It is made in one size only, holding approximately one quart. (The United Shoe Machinery Corporation, Albany Building, Boston, Massachusetts.)

Naphtha Bench Can

CRANE FOR GIANT PNEUMATIC TIRES

With the increase in size and added weight of giant pneumatic tires comes the need of a device for conveniently handling motor truck tires and wheels. With the crane here shown, it is claimed that one man can handle any size of wheel or solid tire, special grab hooks being furnished for use with pneumatic tires. The crane works in small clearance between tire and



Atlas Wheel Crane

fender or body. To provide for variation in wheel diameters, the crane arm may be pivoted at two different heights, thereby permitting two different ranges of vertical lift. Moreover, the crane will pick up wheels which are standing on the floor. (The Thompson Auto Specialties Co., Columbus, Ohio.)

STEEL WIRE BUFFING WHEELS

Steel wire buffing wheels are indispensable in tire making and repairing. The old-type solid wire brush has long since been displaced by wheels made up of sections that fit on a permanent hub. When the sections wear out, new ones are replaced on the old hub and the brush is as good as new. A recent type of steel wire brush is called the "Sampson," section of which is shown in the accompanying illustration.

Sampson Brush Section

(Chas. E. Miller, Anderson Rubber Works, Anderson, Indiana.)

MACHINERY PATENTS

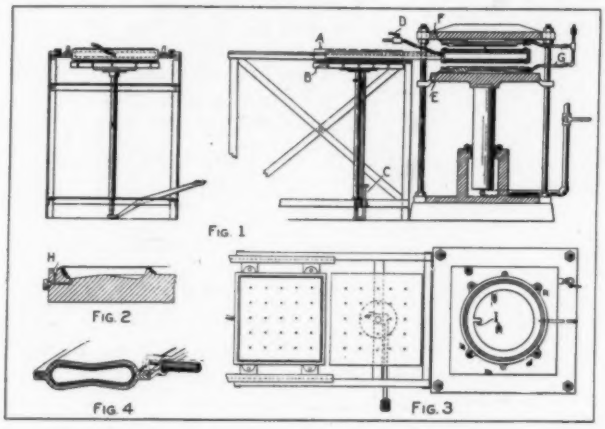
MOLDING INNER TUBES BY THE PNEUMATIC PROCESS

Two-part hollow rubber articles, such as inner tubes, are made by this process, whereby the parts are first cut from a sheet, formed in a mold which causes the edges to adhere, and then removed to a vulcanizing mold in which they are seated by internal pressure.

In carrying out this process a square sheet of raw rubber is laid on the upper surface of the plate A and a similar sheet is laid on the table B, shown in Fig. 1. The vacuum plate is then brought to a position directly over the table, the pedal C operated to raise the table, bringing the rubber sheet thereon into contact with the under side of the plate, whereupon the valve D is operated to apply vacuum to this plate, thus drawing both

the rubber sheets closely into contact therewith. The table is then lowered, leaving its sheet held to the under side of the vacuum plate, which is moved to the position shown in Fig. 1, directly between the forming molds.

A valve is operated to apply hydraulic pressure to the plunger, raising the lower forming mold E into contact with the rubber



ROBERTS' TUBE MOLDING AND VULCANIZING APPARATUS

at the under side of the plate A, and the raising movement is continued, carrying the plate upwardly, bringing the upper sheet into contact with the upper mold F. Here the movement of the platen is stopped, the valve D is operated to relieve the vacuum in the plate, and a valve controlling the vacuum tubes G is opened, drawing the air from the mold cavities and from the groove H shown in Fig. 2, securely holding the sheets to the mold members.

The platen is then lowered and the vacuum plate withdrawn, leaving the sheets held to the molds by vacuum. This plate is then moved to the position shown in Fig. 3, and the rubber sheets are again placed upon this plate on the table B while the forming operation is continued in the press.

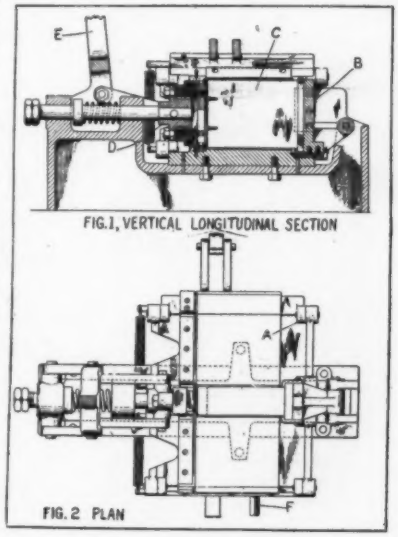
The application of vacuum to the mold is continued until the rubber sheets are stretched tightly into the cavities, when the platens are brought together until the cutting edges meet, severing the rubber within the mold cavities thus forming a substantially flat ring comprising two annular members having their edges pinched together by the bevel surfaces of the cutting edges, and thus caused to adhere. Upon separating the forming molds the tube is then removed and placed in a vulcanizing mold.

In making inner tubes for pneumatic tires, it is desirable to secure the valve stem between the meeting edges of the rubber ring severed from the sheets, so that when a tube thus formed is vulcanized it may be complete. Accordingly the cutting edge is looped inwardly as indicated at I in Fig. 3 and within this loop a cavity is provided into which the rubber is drawn by the suction, so that before bringing the forming molds together to sever the sheets the valve stem may be laid on rubber in the lower mold in this cavity, with its head in the concave portion of the trough. When the mold members are brought together and severed, the rubber is caused to lie closely about the shank of the valve stem and the sheets are severed entirely around the stem by the edges.

The vulcanizing mold illustrated in Fig. 4 preferably comprises two trough-shaped members formed of pressed metal having convex portions complementary to the convex portions of the tube, while at the sides the cavity extends inwardly in concave form, fitting the concave sides of the tube. Flanges provide for securing the mold members together by bolts or clamps. At one point these flanges are bowed outwardly to surround the valve stem and press the rubber into contact therewith, while the remaining portion of the rubber surrounding the shank may be trimmed off at the inner sides of the flanges before vulcanization. A considerable number of tubes carried in such molds are inflated therein, pressing the walls of the tube tightly to the inner surfaces of the mold. These are then placed in a vulcanizing chamber and cured. (Fred T. Roberts, Cleveland Heights, Ohio, assignor to Paramount Rubber Consolidated, Inc., Philadelphia, Pennsylvania. United States patent No. 1,346,848).

MACHINE FOR FORMING BATTERY JARS

The operation of this apparatus is started with the wrapping box *A* opened out flat, as shown in Fig. 2 and the mandrel holder *B* turned up from the position represented in the drawings so that a core *C* will occupy an inverted vertical position. In this position, the pieces of raw stock for forming the lugs may be inserted in their grooves, and the bottom-forming sheet accurately laid on the end of the mandrel. A side-forming sheet cut to the proper size is laid on the opened-out box and properly registered with the edges thereof, its bottom edge being slightly overlapped upon the edge-turning plates. The holder and mandrel are then swung down into horizontal operative position, and the plunger *D* is advanced until its presser-plate rests against the work to hold the bottom sheet in place as shown in Fig. 1, the weight of the lever *E* keeping the parts in this position while the side wrapping is performed. Then the free sections of the wrapping box, carrying with them the super-imposed portions of the side-forming sheet, are closed upon the mandrel. First, the two wider side sections are swung upwardly into position, and then the third section is turned over on the upper side of the mandrel and clamped by a cam lever which produces pressure on the work. The final step in the side-folding operation consists in turning the fourth folder section and its corresponding sheet portion over on the upper face of the mandrel by means of the handle *F* and applying pressure to the side seam formed by the overlapping skived edges of the rubber sheet. The wrapping action is progressive and avoids the entrapping of air. The final closing movement of the fourth section causes a shearing action which trims off the excess of material on the outer side of the seam.



BATTERY JAR MACHINE

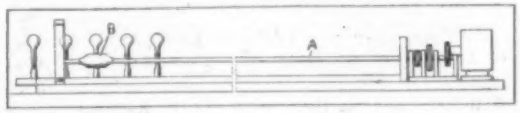
By pressure on the hand-lever *E* the plunger compresses and embosses the bottom sheet and consolidates it with the lugs while the seam-pressing plates on the plunger compress the inwardly-turned edges of the side sheet and perfect the bottom seams. The wrapping box is then unclamped and opened out, and the mandrel with the formed jar thereon, is swung upwardly into vertical position. It may then be removed by sliding it from the holder and the jar vulcanized in the usual manner while still on the mandrel. Another mandrel is then substituted and

the foregoing operations repeated. (James H. Wagenhorst, Akron, Ohio, United States patent No. 1,338,470.)

MACHINERY PATENTS

MACHINE FOR FORMING TOY BALLOON BEADS

A PARALLEL SERIES of forms are secured to the form boards adapted to support the balloons. A rectangular frame is secured to the base of the machine, allowing the form boards to be moved through the frame. Horizontal shafts arranged in pairs are



BEAD-ROLLING MACHINE

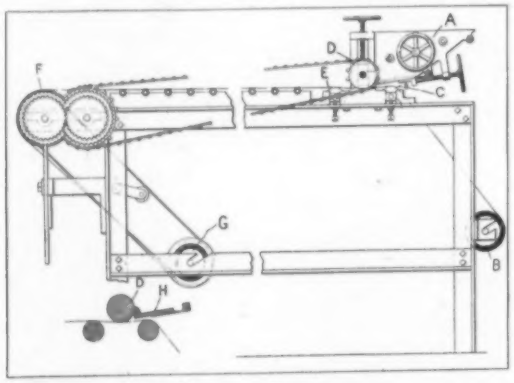
bracketed and geared so that they turn in the opposite direction. On each shaft *A*, a rotary brush *B*, covered with chamois or other flexible material, provides a yielding friction surface to rub against the ends of the balloons.

As the form board is slid in and out of the guide formed by the base, the forms will bring the balloons into contact with the covered brushes, and the rolls or beads will be quickly and uniformly made. (Harry B. Gill, Ashland, Ohio. United States patent No. 1,346,706.)

A NOVEL SPREADING MACHINE

This invention employs a roller for applying the rubber solution to the fabric instead of the usual spreading knife or "doctor."

The dope is placed in the hopper *A* and a web of uncoated fabric drawn from the roll *B* over the guide roller *C* beneath the spreading cylinder *D*, over the guide roller *E*, thence over the heating pipes and drum cylinder to the take-up roller *G*. Power is then applied, rotating the cylinder so that its lower portion



A CALENDER SPREADER

moves in the direction of the travel of the fabric. The web of fabric is driven by the cloth covered drum *F*, through gearing, at the desired rate of speed relatively to the speed of the spreading cylinder.

The gate *H* is adjusted to deliver a sheet of dope of a predetermined thickness upon the surface of the roller which spreads it upon the fabric, condenses the coating and smoothes it by its wiping contact so that a desirable finish is produced.

The coated fabric thereupon passes over the drying coils with the back or uncoated side of the fabric toward the coils so that the heat is applied through the fabric and back of the coating. (Andrew Thoma, Cambridge, assignor to Abraham Sydeman, Boston—both in Massachusetts. United States patent, No. 1,346,615.)

OTHER MACHINERY PATENTS

THE UNITED STATES

NO. 1,340,776.* Apparatus for reclaiming rubber. F. L. Kryder, Akron, O., and E. W. Snyder, Indianapolis, Ind.

1,348,228. Apparatus and method for electrically vulcanizing tires. J. Ledwinka, assignor to Edward G. Budd Manufacturing Co.—both of Philadelphia, Pa. (Renewed January 8, 1920.)

1,348,316. Apparatus for cutting rings and washers from rubber tubing. J. E. Perrault, assignor to Hood Rubber Co.—both of Watertown, Mass.

1,348,596. Tire-building stand. E. Sterns, St. Louis, Mo., assignor to Surety Tire & Rubber Co., a Delaware corporation.

1,348,612. Separable sectional core for tires. G. H. Willis, assignor to The Miller Rubber Co.—both of Akron, O.

1,349,039. Repair vulcanizer. A. A. Bitter, Los Angeles, Calif., assignor by mesne assignments to Western Vulcanizer Manufacturing Co., Chicago, Ill., a copartnership.

1,349,366. Tire abrader. F. N. Cordell, St. Louis, Mo. (See THE INDIA RUBBER WORLD, February 1, 1920, page 297.)

1,349,390. Apparatus and process for the manufacture of tires. J. A. Swinehart, Akron, O.

1,349,424. Apparatus for the manufacture of pneumatic-tire casings. E. Hopkinson, New York City.

1,349,560. Apparatus and process for producing a hollow rubber biscuit. H. Z. Cobb, New York City, assignor to The Mechanical Rubber Co., a New Jersey Corporation.

1,349,688. Tire and tube vulcanizer. O. Nichols, Mound Valley, Kans.

1,349,693. Repair vulcanizing apparatus. W. S. Robinett, Oakland, Calif.

1,349,721. Apparatus for use in vulcanizing pneumatic-tire casings. E. Hopkinson, New York City.

1,349,752. Apparatus for recovering rubber from armored hose, etc. C. F. Erb, Youngstown, O.

1,349,796. Vulcanizing mold for boots and shoes. D. F. Wilhelmi, Doorwerth, Netherlands.

1,350,105. Mold for rubber heels. H. F. Maranville, assignor to the Firestone Tire & Rubber Co.—both of Akron, O.

1,350,117. Bead-forming ring for molding pneumatic tires. J. Schmidt, assignor by mesne assignments to Howe Rubber Corporation —both of New Brunswick, N. J.

*Omitted from our issue of July 1, 1920.

THE DOMINION OF CANADA

ISSUED JULY 27, 1920

202,260 Tire dressing wheel. S. M. Taber and P. E. Taber, Berkeley, Cal., U. S. A.

ISSUED AUGUST 17, 1920

203,007 Repair vulcanizing apparatus. W. H. Miles, Stafford, England.

203,099 Apparatus for placing tires in molds. The Dunlop Rubber Co., Ltd., Westminster, Co. of London, assignee of C. Macbeth and E. Sullivan, both of Birmingham, Co. of Warwick—all in England.

203,105 Pneumatic tire building machine. The Goodyear Tire & Rubber Co., assignee of J. D. Thompson, both of Akron, O., U. S. A.

THE UNITED KINGDOM

143,927 Tipping-apparatus for kneading-machines, etc. Canstatter Misch- und Knetmaschinen-Fabrik, Canstatter Dampf-Backofen-Fabrik Werner & Pfleiderer, Pragstrasse, Canstatt, Stuttgart, Germany. (Not yet accepted.)

144,779 Repair vulcanizer. H. Frost & Co., 148 Great Portland street, London, and W. H. Welch, 182 Ashley Down road, Bishopstone, Bristol.

144,822 Apparatus for making cord tires. Vickers, Ltd., Vickers House, Broadway, Westminster, Sir J. McKechnie, Naval Construction works, Barrow-in-Furness, and A. Ryan, 43 Cranbrook street, Oldham.

144,041 Apparatus for making hollow rubber articles. Paramount Rubber Consolidated, 5232 Germantown avenue, Philadelphia, Pa., assignee of F. T. Roberts, 1051 Power avenue, Cleveland, Ohio—both in U. S. A. (Not yet accepted.)

PROCESS PATENTS

THE UNITED STATES

NO. 1,348,164. Putting beads on tire carcasses. W. G. Fording, assignor to J. T. Lister—both of Cleveland, O.

1,348,755. Manufacture of clutch facings. S. Simpson, assignor to The Raybestos Co.—both of Bridgeport, Conn.

1,349,423. Manufacture of pneumatic tires. E. Hopkinson, New York City.

THE UNITED KINGDOM

144,809 Making hollow rubber articles such as valve balls. F. T. Roberts, 1105 Lakeview road, and R. H. Rosenfeld, 1895 East 71st street—both in Cleveland, Ohio, U. S. A.

DIATO

Pure diatomaceous earth from an extensive fresh water deposit located in Oregon is being introduced to the rubber manufacturing industry. Analysis and microscopic examination shows Diato to be practically free from lime, entirely free from grit, and contains only two types of diatoms. These are in the form of hollow cylinders possessing relatively larger cavities than is the case with the discoid forms which are so often the dominating types in diatomaceous deposits.

New Goods and Specialties

AN X-RAYED GOLF BALL

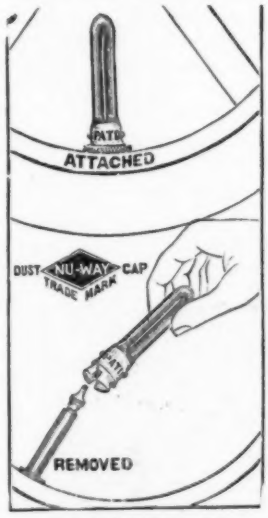
THE perfect central balance of the ideal golf ball is obtained by building evenly around a heavy core. A ball that is tested by X-ray for core imperfections would seem a help towards avoiding an erratic game. The "Clincher Cross" golf ball is X-rayed before leaving the factory, to make sure that the core has not become displaced during the building and molding operations. (North British Rubber Co., Limited, London, England. American representative, James Peckham, 17 Battery Place, New York City.)

"CLINCHER CROSS" GOLF BALL

QUICK REPAIR FOR PUNCTURES

A handy little repairing device for punctures is the "No-C-Ment" puncture plug, which, the maker claims, will repair any puncture in less than ten seconds without using cement. The plug is made of soft rubber, mushroom-shaped, with a hollow "stem" into which a small lead ball is inserted, and works on a pneumatic principle automatically to close the puncture. "No-C-Ment" puncture plugs are made in two sizes. (H. & K. Accessory Co., 4005 West North avenue, Chicago, Illinois.)

"NO-C-MENT" PLUG



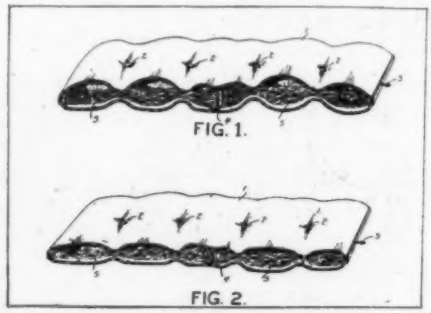
"NU-WAY" DUST CAP

PNEUMATIC-TIRE DUST CAP

The "Nu-Way" dust cap for pneumatic tires is a combined dust cap and nut which can be instantly removed and attached. The maker claims it will do away with tedious waits while filling tires. "Nu-Way" caps are made of high-grade materials and will add to the appearance of any car. (A. L. Just Manufacturing Co., Syracuse, New York.)

SEMI-STUFFED AIR CUSHION

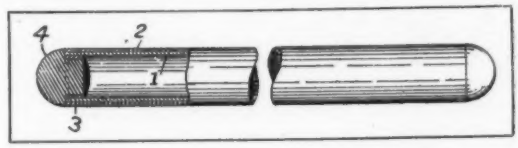
Pneumatic cushions are almost indispensable to motorists and canoeists, but their extreme resiliency often makes them a dangerously unsteady seat. An air cushion that furnishes a substantially firm seat when inflated, and a comfortable support even if partially or wholly deflated, is a recent patent. It is preferably oblong in shape, of rubberized fabric enclosing a layer of fibrous material. Bolts pass through the cushion, forming tufts to hold the fibrous filling in place. An inner partition divides the cushion into two parts, and a valve at one end is used for inflating. (Edwin S. Sylvester, West New Brighton, New York, assignor to Rubber Regenerating Co., Naugatuck, Connecticut. United States patent No. 1,332,933.)



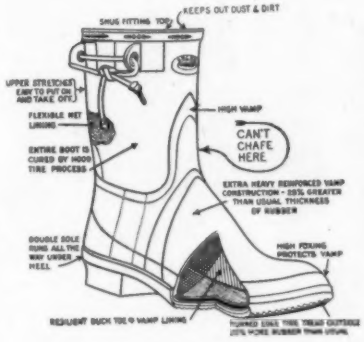
INFLATED FIBER-STUFFED CUSHION

RUBBER-COVERED DYE STICK

An improved dye stick that will not be affected by heat, moisture, or chemicals while in use is composed of a thin tube of metal (1) enclosed in a close-fitting, smooth-surfaced tube of hard rubber, (2) lapping over the metal tube at the ends, (3) or cut flush. Secured in each end of the tube may be a soft rubber plug (4) which will prevent injury to the tube if accidentally dropped endwise. In dyeing cloth or yarn the dye stick must not catch in the material while changing its position in the vat of dye. Wooden dye sticks quickly splinter and injure the fabric. (W. F. Foley, assignor to India Rubber Co., New Brunswick, New Jersey. United States patent No. 1,337,009.)



SMOOTH-SURFACED DYE STICK



HOOD MINER'S "FLEX-I-PAC"

MINER'S RUBBER SHOE PAC

The new Hood "Flex-I-Pac" has been designed especially to obviate the uncomfortable features of the old-style miner's pac. Its extreme flexibility is attained, the maker says, without in any way lessening its wearing qualities. The shoe is made without a flap. The girth at the top is just large enough to admit the foot and can be tightened to the leg by means of the tie-strap. This excludes dust and dirt to a minimum and eliminates painful irritations that lessen production. The "Flex-I-Pac" is made of the highest quality materials. The turned edge tire tread outsole uses 20 per cent more rubber than usual. The double sole runs all the way under the heel and the entire boot is cured by the Hood tire process. The maker claims for the shoe extra long wear and absolute comfort. (Hood Rubber Products Co., Inc., Watertown, Mass.)

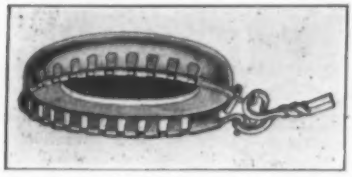
"MALTESE CROSS SCOOP" HEEL

A CANADIAN RUBBER HEEL

A new design of the old standard "Maltese Cross" rubber heel is illustrated here, called the "Scoop." It is of the concave type that is now so popular because of its added springiness and gripping qualities. The finish and workmanship of the "Scoop" rubber heel are of the highest standard of "Maltese Cross" quality. (Gutta Percha & Rubber Co., Limited, 47 Yonge street, Toronto, Ontario.)

A SAFETY BOTTLE CAP

A bottle cap developed from the point of view of the bottle user, that can be opened easily without an opener or corkscrew, that closes securely and stays closed, is called the "Kork-N-Seal." It consists of a metal cap, cork-lined, fitting closely over a rubber gasket, and having a wire ring within the outwardly rolled edge, contracted by a slight pressure of the finger on a small wire lever attached to the ends of the ring. This closes the cap tightly over the rubber gasket and hermetically seals the bottle. (The Williams Sealing Corporation, Decatur, Illinois.)



The "Kork-N-Seal" for Bottles

THE UNIVERSAL NATURAL MILKER

A mechanical milking machine that beats the old-time hired man in speed and cleanliness and rivals him in action is the "Universal Natural Milker," which has been carefully constructed so that it cannot injure the udder of the cow. It has few parts, including, besides the necessary vacuum outfit, one pipe line through the barn connecting the vacuum pump to the milk pail, and on top of the pail a vacuum pulsator with two rubber tubes extending to a cluster of four teat cups, each lined with the best soft rubber. At the top of each cup is a solid rubber ring—soft, like the calf's nose, leaving no cold metal to touch the cow. The vacuum action in the rubber air tubes attached to the teat cups makes possible the alternating action which the manufacturer asserts is the nearest approach to the natural feeding method of the calf. The rubber lining of the teat cups permits a massaging action similar to that of the sucking calf. It is claimed the machine will save money for any farmer milking six cows or more. (The Universal Milking Machine Co., 200 West Mound street, Columbus, Ohio.)

"Universal" Milking Machine; Teat Cup and Its Rubber Liner

The Eno "Exso" Tire

A TIRE WHOLESOLE

A new type of repair-tire is the Eno "Exso" tire, a wholesole which is vulcanized from the outside and produces a tire that looks like new. The "Exso" tire is made of the best tire fabric, breaker, cushion, and tread stock, and is said to have the wearing qualities of a new tire at half the cost. (George W. Eno Rubber Co., 1026 South Los Angeles street, Los Angeles, California.)

NEW HUNTING EQUIPMENT

Of the new host of articles brought out yearly, intended to add to the comfort of the hunter and deplete his pocketbook, the most comfortable to be had at reasonable cost sell best.

Fishing Coat Ladies' Outing Boots Under Pants

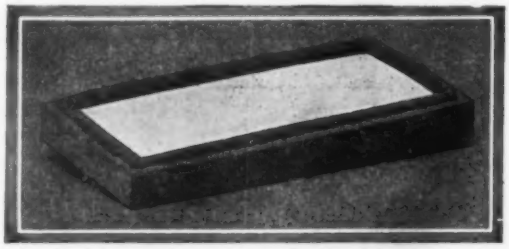
The fishing coat shown has five pockets, one rubber-lined and reversible for bait, and a fish or game bag of double-coated washable material, conveniently attached to the back but out of the way when walking through brush.

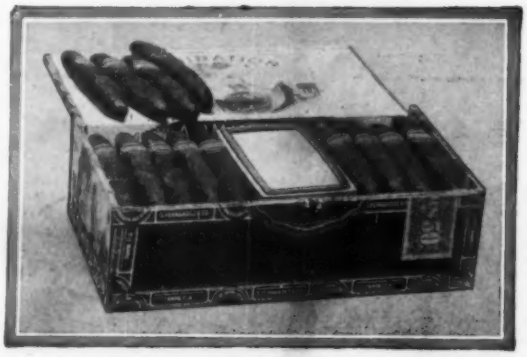
The woman's outing moccasin is sporty-looking and most practical and comfortable for fall hunting. Ten inches high, it has waterproof, flexible rubber sole and soft, smoked elk upper.

Convenient and economical, too, are the waterproof and windproof under-pants for men to be worn under regular trousers in rain or snow. The legs and seat are of light-weight rubber-coated material, the waist and body not rubberized. (L. L. Bean, Freeport, Maine.)

MOISTENING DEVICE FOR CIGARS

This new "Humidyzor" is made of fine white biscuit porcelain encased in a moisture-proof and mar-proof rubber tray that is odorless and eliminates all possibilities of damaging the cigars with either moisture or marring. Pearson's cigar "Humidyzor" is said to keep a box of cigars conditioned from two to ten days. (Pearson Products Co., 725 Broadway, New York City.)





Pearson's Cigar-Box "Humidyzor"

THE OBITUARY RECORD

GENERAL SUPERINTENDENT OF THE HEWITT RUBBER COMPANY

Edward H. Openshaw, general superintendent of the Hewitt Rubber Co., Buffalo, New York, died on September 10. Although he had been in poor health during the past few years and had failed perceptibly in the last two months, yet his passing away was sudden and quite unexpected. His declining health was caused by hardening of the arteries, which brought about slight strokes which caused his death.

Edward H. Openshaw

Mr. Openshaw was born in Osswald Twistle, England, September 7, 1863, and arrived in Philadelphia on his nineteenth birthday in 1882. He started his rubber career with the Home Rubber Co., Trenton, New Jersey, and was connected there for a period of twenty-five years. From 1908 to 1914 he was with the Cincinnati Rubber Manufacturing Co. and the United & Globe Rubber Cos. as general superintendent. In 1914 he accepted the position of general superintendent with the Hewitt Rubber Co., with which company he was active until his death.

Mr. Openshaw was well known throughout the rubber industry, particularly in the mechanical goods line, with which he was so long and successfully connected. He invented many new manufacturing methods which are still in use, having never been improved upon, and incidentally was the first to succeed in vulcanizing rubber to horseshoes.

Mr. Openshaw was a man with a loyal and upright character, who easily made and retained a host of friends. He was a member of the Ashler Lodge, Free and Accepted Masons, and Zuleika Grotto No. 10.

He is survived by his widow, daughter and two sons, Frank and Edward, both of whom are connected with the rubber industry, the former with the Cincinnati Rubber Manufacturing Co., and the latter with the Hewitt Rubber Co.

WELL KNOWN IN NEW YORK RUBBER CLOTHING TRADE

The Clifton Manufacturing Co., Boston, Massachusetts, announces, with great regret, the death of T. Frank McCarthy on September 10, 1920. Mr. McCarthy has been the New York representative for the rubber surface clothing department and had a host of friends in the rubber clothing trade. He was respected and esteemed for his honorable dealings as well as for his genial disposition, unfailing kindness and helpfulness to all his acquaintances in that business.

His death will be sincerely mourned by his customers, and his loss will be deeply deplored by the company with which he was so long connected, and by whom his services were greatly valued.

A PIONEER IN SOUTH AMERICAN SHIPPING

Michael P. Grace, chairman of the board of directors of William R. Grace & Co., the large shipping organization, died September 20 in London, England, aged 78. Mr. Grace was also head of Grace Brothers & Co., Limited, of London, and a brother of the late William R. Grace, a former mayor of New York City.

Michael P. Grace was born in Queenstown, County Cork, Ireland, and at an early age went to Peru, where his father, James Grace, had sought to establish an Irish agricultural colony, and where his brother, W. R. Grace, had become a partner in the trading firm of Bryce, Grace & Co.

W. R. Grace came to the United States and established the house of W. R. Grace & Co., Michael P. Grace remaining in Peru, building the business into the largest in the country and operating a vast fleet of ships which carried much of the South American rubber to New York and London.

After the Chile-Peruvian war of 1877-1881 Michael P. Grace, who had become an American citizen and had assumed charge of the parent house in New York, went to Peru to further develop the business and to extend it to Chile. Later he resided for some years in England, making his home in the famous Battle Abbey at Hastings.

Mr. Grace is survived by his widow, who lives in London, and three daughters, Mrs. J. S. Phipps of New York City, the Countess of Donoughmore and Mrs. Joseph Benskin of London.

RUBBER TRADE INQUIRIES

THE inquiries that follow have already been answered; nevertheless they are of interest not only in showing the needs of the trade, but because of the possibility that additional information may be furnished by those who read them. The editor is therefore glad to have those interested communicate with him.

(826) A subscriber desires the name and address of the present manufacturer of the Bachmann hose-wrapping machine, formerly made by a company now gone out of business.

(827) A reader desires the address of the manufacturer of "Nitrex," used for painting tires to protect from sun and atmosphere.

(828) A manufacturer desires to know the average tensile strength of rolled brown crêpe.

TRADE OPPORTUNITIES FROM CONSULAR REPORTS

Addresses may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., or from the following district or cooperative offices. Requests for each address should be on a separate sheet, and state number.

District Offices	Cooperative Offices
New York: 734 Customhouse.	Cleveland: Chamber of Commerce.
Boston: 1801 Customhouse.	Cincinnati: Chamber of Commerce; General Freight Agent, Southern Railway, 96 Ingalls Building.
Chicago: 504 Federal Building.	Los Angeles: Chamber of Commerce.
St. Louis: 402 Third National Bank Building.	Philadelphia: Chamber of Commerce.
New Orleans: 1020 Hibernia Bank Building.	Portland, Oregon: Chamber of Commerce.
San Francisco: 307 Customhouse.	Dayton, Ohio: Dayton Chamber of Commerce.
Seattle: 848 Henry Building.	

(33,598) A cooperative mercantile company in Australia desires to purchase and secure an agency for the sale of tires and tubes.

(33,604) A merchant in Canada desires to correspond with manufacturers in position to export rubber horse-shoe pads. Cash on delivery. Quote f. o. b. port of shipment.

(33,606) A commercial agent in Turkey desires to represent firms for the sale of rubber overshoes. Quote c. i. f. Constantinople. Payment in United States currency, 20 to 25 per cent with order, balance against documents.

(33,620) A manufacturer in South Africa desires to secure an agency for the sale of rubber soles and heels, canvas tennis boots and shoes, uppers for sewing soles on same (not for vulcanizing), molds for making rubber soles, stitching machines for attaching rubber soles, motor tires and tubes, mechanical rubber goods, rubber compound for tire repair work and retreading, also reclaimed rubber for mold work, of which samples and prices are required.

(33,633) A tire and rubber agency company in New Zealand desires to secure the sole agency for the sale of good tires and tubes that can be guaranteed for use on the roads of that country. Quote c. i. f. New Zealand port.

(33,656) A commercial agency firm in Portugal desires to secure an agency for the sale of automobile tires. Correspondence may be in English. Catalogs and price lists requested.

(33,674.) A mercantile firm in Mexico desires to purchase erasers, fountain pens, and rubber stamp material. Quote c. i. f. El Paso, Texas. Correspondence may be in English.

(33,676.) A firm of selling representatives in the British West Indies desires to obtain illustrated catalogs and prices of rubber boots and shoes.

(33,678.) A firm of merchants in one of the Baltic provinces desires to represent a manufacturer of rubber shoes. Correspondence may be in English.

(33,718) A merchant in Spain desires to secure an agency for the sale of rubber goods. Quote c. i. f. Spanish port. Correspondence should be in Spanish.

(33,733) A merchant in Austria desires to establish relations with manufacturers with a view to securing an agency for the sale of American tires.

33,737) An agency is desired by an inquirer in Italy for the sale of belting and rubber goods. Correspondence should be in Italian, though English may be used.

(33,739) A firm of manufacturers in Austria desires to secure an agency for the sale of automobile tires.

THE EDITOR'S BOOK TABLE

HOW TO MAKE AND USE A SMALL CHEMICAL LABORATORY. By Raymond Francis Yates. The Norman W. Henley Publishing Company, New York, 1920. (Paper, 102 pages, 5 by 7¾ inches.)

THE AUTHOR has successfully accomplished the task of preparing a book for those who wish to become acquainted with the great fundamentals of chemistry. The author has not followed the usual method of treatment but begins at once by explaining in non-technical language the nature and relations of molecules, atoms and electrons. Since chemistry is discussed to-day in terms of the Electron Theory, familiarity with its outstanding features is essential at the beginning of its study. The second part of the book is occupied by instructions to the amateur chemist on the construction of a home laboratory, while a third section is devoted to experiments illustrating the broad aspects of chemical science and to methods of constructing necessary apparatus.

"HAND-BOOK OF FIRE PROTECTION." BY EVERETT N. CROSBY, Henry A. Fiske and H. Walter Foster. Sixth Edition, 1920. D. Van Nostrand Co., New York City. (Cloth, 757 pages, 4½ by 6¾ inches.)

This volume is the standard compilation on the fundamental principles of fire protection. Its several distinct divisions cover: (1) general, giving an understanding of the magnitude of fire prevention and fire protection, its relation to accident prevention, the opportunities and responsibilities of the fire protection engineer, and the functions and interrelations of the National Fire Protection Association, the National Board of Fire Underwriters, and the Underwriters Laboratories; (2) causes of fire; (3) spread of fire; (4) construction for special occupancies; (5) extinguishment of fire; (6) miscellaneous, relating to egress, self-inspection and protection of records and valuables; (7) tables of data; (8) index. As a reference book it is invaluable to engineers, architects and plant managers.

NEW TRADE PUBLICATIONS

THE Tire Surgeon, VOLUME I, NUMBER 1, HAS MADE ITS appearance, dated September 10, 1920. It is a 12-page illustrated monthly especially for the tire repair man, part trade paper and part house organ, published by the Hayward Tire & Equipment Co., Indianapolis, Indiana.

"TRADE WITH THE ORIENT" IS THE TITLE OF ONE OF A SERIES OF attractive 32-page pamphlets on foreign and domestic trade published by the Bank of Pittsburgh National Association, Pittsburgh, Pennsylvania, for free distribution. It presents in condensed and graphic form some of the more salient facts and data bearing upon the resources and trade of the leading transpacific countries, and serves to acquaint American manufacturers, exporters and importers with the possibilities of foreign trade in the near and far East.

JUDICIAL DECISIONS

THE GREAT REPUBLIC TIRE & RUBBER MANUFACTURING COMPANY ENJOINED.

FEDERAL TRADE COMMISSIONS VS. THE GREAT REPUBLIC TIRE & MANUFACTURING CO.

The respondent, a corporation organized and doing business under the laws of the State of Delaware, and having its office and place of business in Muskogee, Oklahoma, engaged in the sale of automobile tires and inner tubes branded and advertised as "Great Republic" tires and tubes, notwithstanding a full knowledge of the existence of the Republic Rubber Co., of Youngstown, Ohio, engaged in the manufacture and sale of tires and tubes under the brand name "Republic."

The respondent is forbidden to use the brand name "Great Republic," any phrase including the word "Republic" or suggestion of it. The company is also forbidden to use the corporate name, "The Great Republic Tire & Rubber Manufacturing Co.," except in connection with the words, "of Muskogee, Oklahoma," and unless there is substituted in place of the brand name "Great Republic" another brand name equally conspicuous but in no wise similar. (Federal Trade Commission, Docket No. 492, Washington, D. C., August 10, 1920.)

INTERESTING LETTERS FROM OUR READERS

ABOUT A NOVEL TOY BALL

TO THE EDITOR:

DEAR SIR:—

In THE INDIA RUBBER WORLD, July 1, 1919, you kindly published an article showing my novelty ball. In consequence of the world-wide publicity, I had letters from the Dutch traders in Holland and many from the United States. I have made every effort to get them made, but the factories are all "too busy."

Will you be kind enough to tell me if there are any books for beginners in rubber work, or where could I get information on the subject of making rubber balls; also the apparatus and material for making in an experimental way, after which I shall organize a company for making on a larger scale. It is surely an improvement on what is recorded as the most salable toy ever placed on the market.

Thanking you greatly for any information you can give, I remain,

C. OTIS GRIFFIN.

Box 184, New Bern, North Carolina.

HOT VULCANIZATION OF RUBBER

F. Kirchoff in a recent article[1] claims that he discovered and announced before Harries the physical-chemical principle of vulcanization by heat, granting to Harries the credit of having established by experiment the difference between primary and after-vulcanization.

The chemical interpretation of vulcanization has undergone various modifications through the development of our knowledge of the constitution of rubber, due to Harries and to the investigations of Schmitz on the action of bromine or depolymerized rubber.

THE UNITED STATES POSTAL BULLETIN FOR SEPTEMBER 3, 1920, announces that among the articles that may be imported into Germany by parcel post without special authorization are balata, raw or cleaned or the refuse of balata; gutta percha, raw or cleaned, or the refuse of gutta percha; and rubber, raw or cleaned or the refuse of rubber.

[1]Kolloid Zeitschrift, 1920, 26, 168-173.

News of the American Rubber Industry

DIVIDENDS

THE American Zinc, Lead & Smelting Co., Boston, Massachusetts, and St. Louis, Missouri, has declared its regular quarterly dividend of $1.50 per share, payable November 1 on preferred stock of record October 15, 1920.

Ames-Holden-McCready, Limited, Montreal, Quebec, has declared its quarterly dividend of 1¾ per cent, payable October 1 on preferred stock of record September 17, 1920.

The Boston Woven Hose & Rubber Co., Boston, Massachusetts, declared its quarterly dividend of $3 per share, payable September 15 on stock of record September 1, 1920.

The Corn Products Refining Co., New York City, has declared a quarterly dividend of $1 and an extra dividend of fifty cents per share, both payable October 20 on common stock, and a quarterly dividend of $1.75 per share payable October 15 on preferred stock, all on stock of record October 4, 1920.

The Driver-Harris Co., Harrison, New Jersey, has declared quarterly dividends of one and three-quarters and two per cent on preferred and common stock, respectively, both payable October 1 on stock of record September 20, 1920.

The E. I. du Pont de Nemours & Co. (incorporated), Wilmington, Delaware, has declared a dividend of 1½ per cent on its debenture stock, payable October 25 on stock of record October 9, 1920; also a quarterly dividend of $2 cash and $2.50 stock per share, payable September 15 on common stock of record August 31, 1920.

The Harbirshaw Electric Cable Company, Inc., Yonkers, N. Y., has declared its regular quarterly dividend of 37½ cents per share, payable October 1, on stock of record September 20, 1920.

The Kelly-Springfield Tire Co., New York City, has declared a quarterly dividend of $1.50 per share on its six per cent preferred stock, payable October 1 on stock of record September 20, 1920.

The Keystone Tire & Rubber Co., Inc., New York City, has declared a quarterly dividend of 5 per cent, payable October 1 on preferred stock of record September 15, 1920.

The McGraw Tire & Rubber Co., Cleveland and East Palestine, Ohio, has declared its regular quarterly dividend of one and three-quarters per cent.

The National Aniline & Chemical Co., New York City, has declared a dividend of 1¾ per cent on preferred stock of record September 13, payable October 1, 1920; also a stock dividend of four-tenths of one share of common stock, payable October 9 on common stock of record October 1, 1920.

The Salmon Falls Manufacturing Co., Boston, Massachusetts, declared a regular quarterly dividend of 2½ per cent, payable September 1 to stockholders of record August 25, 1920.

The United Shoe Machinery Corporation, Boston, Massachusetts, has declared dividends of one and one-half per cent on preferred stock and of 50 cents per share on common stock, both payable October 5 on stock of record September 20, 1920.

FINANCIAL NOTES

The president of the First National Bank of Philadelphia issues a statement which says, in part: "The country is making excellent progress in cashing in its high price inventories, and, slowly but surely, the nation is adopting a more reasonable price level. The situation must be handled with great care, however, as transition is no easy task because of the extraordinarily high level attained by general prices throughout the list of commodities."

Net earnings of The Mason Tire & Rubber Co. for the third quarter ended July 31, were $152,011.16. This makes total net earnings for the first nine months of the present fiscal year of $841,490.18, before deduction of taxes, but after deduction of depreciation. Net earnings for the first nine months of last year amounted to $195,000, so that current earnings are running at the rate of four times larger than the preceding year.

The following is a statement of earnings of the United States Rubber Co. for the six months ended June 30, 1920: Total sales, $129,588,986; net income before interest, but after provision for depreciation and for Federal, Canadian and British taxes, $15,596,831; interest, $1,905,907; net income, $13,690,924; dividends first preferred stock, $2,600,000; dividends to minority stockholders of sub-companies, $9,359; total dividends, $2,609,359; balance, $11,081,565; dividends common stock, including provision quarterly dividend payable July 31, 1920, $3,240,000; surplus, $7,841,565; previous surplus, $52,310,162; total surplus, $60,151,727; less 12½ per cent common stock dividend, $9,000,000; total surplus, $51,151,727; additions to surplus account, $338,308; final surplus, $51,490,034.

The consolidated general balance sheet as of June 30, last, shows:

Assets—Cash, $14,333,748; accounts receivable, $50,938,776; notes and loans receivable, $2,953,238; United States Liberty Bonds, etc., $44,876; notes receivable of employes given for purchase of capital stock, $7,758,564; manufactured goods and material, $127,846,245; securities owned and held in insurance fund, $2,331,778; securities owned, including stock of United States Rubber Co. held by subsidiary companies, $5,098,096; plants, properties and investments including rubber plantations, $161,243,873; prepaid and deferred assets, $3,371,649; total, $375,920,847.

Liabilities: Total capital stock, $146,277,400; accounts payable and accrued liabilities, $24,113,347; acceptances payable for importation of crude rubber, $1,644,485; notes and loans payable, $41,255,000; United States Rubber first and refunding mortgage bonds, etc., $67,026,800; general reserves, $16,021,666; insurance fund reserve, etc., $2,705,367; reserve for depreciation of property, $15,757,469; reserve for preferred dividend payable July 31, 1920, $1,300,000; reserve for dividend on common stock payable July 31, 1920, $1,620,000; fixed surpluses subsidiary companies, $6,709,275; surplus, $51,490,035; total, $375,920,847.

The Goodyear Tire & Rubber Co.'s sales for August exceeded $19,000,000, according to announcement by the company. This is $2,000,000 more than sales of July, which totaled $17,185,000, and brings the total sales for the first ten months of the fiscal year to more than $180,000,000 or $13,000,000 in excess of total business for the entire fiscal year of 1919.

RUBBER STOCK QUOTATIONS

The following quotations on the Cleveland Stock Exchange, September 20, of stock of the principal rubber companies were supplied by Otis & Co., Cuyahoga Building, Cleveland, Ohio.

	Last Sale	Bid	Asked
Firestone T. & R. Co.	117	...	...
Firestone T. & R. Co., 1st pfd.	93	...	...
Firestone T. & R. Co., 2d pfd.	85¾	85½	...
General T. & R. Co., pfd.	102	...	102½
The B. F Goodrich Co.	52¼	...	...
The B. F. Goodrich Co., pfd.	87	87	...
The Goodyear T. & R. Co.	100¼	99	100
The Goodyear T. & R. Co., 1st pfd.	83	82½	83¼
Kelly-Springfield T. & R. Co.	156⅛	...	...
Kelly-Springfield T. & R. Co., pfd.	120	...	...
The Miller Rubber Co.	120	118	...
Portage Rubber Co.	59½	50	58
Portage Rubber Co., pfd.	60	...	70
Star Rubber Co.	350¾	...	...
Swinehart T. & R. Co.	80	...	...
Victor Rubber Co.	29	25	29

NEW YORK STOCK EXCHANGE QUOTATIONS

SEPTEMBER 23, 1920

	High	Low
Ajax Rubber Co., Inc.	46	45½
The Fisk Rubber Co.	24⅜	23⅛
The B. F. Goodrich Co.	53	51¼
The B. F. Goodrich Co., pfd.	86⅝	86½
Kelly-Springfield Tire Co.	66	61½
Kelly-Springfield Tire Co., pfd.	82½	82½
Keystone T. & R. Co., Inc.	15⅞	15
Lee R. & T. Corp.	21⅛	21⅛
United States Rubber Co.	85½	82⅞
United States Rubber Co., pfd.	106½	106½

NEW INCORPORATIONS

Alastic Tire Cushion Co., February 11 (Missouri), $25,000. G. G. Giese, president and treasurer; R. E. Lee, vice-president; I. Mayer, secretary. Principal office, 1419-21 Locust street, St. Louis, Missouri. To manufacture and distribute punctureless tire cushions and auto specialties.

Allen Tire & Rubber Sales Co., August 30 (Delaware), $25,000. S. H. Baynard, Jr.; A. S. Bishop; R. H. Ochletree—all of Wilmington, Del.

Arrowstar Tire & Supply Co., Inc., September 11 (New York), $10,000. H. Aronson, 15 West 123rd street; S. Starkman, 22 Convent avenue; H. Bernett, 197 Lenox avenue—all of New York City. To deal in auto accessories.

Commonwealth Rubber Corp., The, September 4 (Massachusetts), $150,000. M. S. Donahue, president, Ayer; C. M. Riddock, treasurer and clerk, Haverhill; G. A. Loud, director, 24 Milk street, Boston—all in Massachusetts. Principal office, Boston, Massachusetts. To buy, sell and deal in all kinds of rubber and rubber goods.

Condon Tire Co., Inc., September 10 (New York), $2,000. O. Pershitz; I. Rothstein; F. Lenitz—all of 834 Eighth avenue, New York City. To deal in tires and tubes.

Cumberland Tire and Rubber Co., August 18 (Kentucky), $3,000,000. F. W. O'Brien, Elyria, Ohio; A. L. Henry, Indianapolis, Indiana; S. J. Dant, Louisville, Kentucky. Principal office, Louisville, Kentucky. To buy, sell and manufacture all kinds of rubber goods.

E. L. M. Tire & Rubber Co., July 17 (Wisconsin), $200,000. Lawrence E. and Marion McKimm, both of 1725 Center street; O. E. Ahrens, 504 Main street—both in Racine, Wisconsin. Principal office, Racine, Wisconsin. To manufacture and sell tires and inner tubes, also rubber heels, cement, etc.

Eastern Tire Supply Co., August 20 (Massachusetts), $50,000. H. E. Whitcomb, North Brookfield; C. F. Peters, 4 Dix street; H. D. Whitcomb, 8 Harvard street, both of Worcester—both in Massachusetts. Principal office, Worcester, Massachusetts. To manufacture, repair and deal in automobiles and accessories.

Fiberlock Leather Co., The, August 17 (Delaware), $1,100,000. L. L. Storrs, president; G. Hammond, vice-president; F. A. Johnson, secretary; W. O. Stowell, Jr., treasurer; F. R. Hendryx, assistant treasurer. To manufacture artificial leather.

Hannibal Rubber Co., April 24 (Missouri), $1,000,000. W. J. Richards, president; H. M. Still, vice-president; A. E. Gibson, secretary, general sales manager and advertising manager; S. O. Osterhout, treasurer. Principal office, 305-306 Hannibal Trust Company Building, Hannibal, Missouri. To manufacture tires, inner tubes and other rubber products.

Harrington Tire Corp., September 8 (Massachusetts), $100,000. M. H. Finerty, president, 19 Vine street, Roxbury; A. H. Harrington, treasurer, 17 Fayette street, Cambridge; H. B. Roberts, clerk, 176 River Road, Winthrop—all in Massachusetts. Principal office, Boston, Massachusetts. To manufacture and deal in automobile and truck tires.

Kokomo Rubber Co., Sept. 15 (Delaware), $6,500,000. A. L. Ream; J. Simons; H. C. Kebe—all of Omaha, Nebraska.

La Chappelle Co., August 13 (Massachusetts), $30,000. J. N. McDonald, 39 Richards street, Brighton; C. M. Supple, 409 Marlboro street; F. A. McDonald, 11½ Belvidere street, both of Boston—both in Massachusetts. Principal office, Boston, Massachusetts. To manufacture and sell hose supporters, etc.

McNaull Tire & Rubber Co., September 14 (Delaware), $3,000,000. T. L. Croteau; S. E. Dill; A. M. Hooven—all of Wilmington, Delaware.

National Tire & Rubber Co., August 11 (Massachusetts), $75,000. A. Palder, 144 Ruthven street, Roxbury; H. M. Clifford, 51 Palmer street, Arlington; J. E. Crowley, 86 Dean Road, Brookline—all in Massachusetts. Principal office, Boston, Massachusetts. To manufacture and deal in automobile tires and accessories, etc.

New Standard Rubber Co., July 15 (California), $100,000. C. L. Larzelere, 404 Merchants Trust Building, Los Angeles, California. Principal office, 404 Merchants Trust Building, Los Angeles, California. To manufacture rubber goods.

Paul Tire & Rubber Co., May 28 (North Carolina), $1,000,000. H. Clement; W. E. McWhirter; E. C. Bramard—all of Salisbury, North Carolina. Principal office, Salisbury, North Carolina. To manufacture tires.

Rubber Supplies Company of Dayton, Inc., August 26 (New York), $10,000. P. M. Hooven, 117 West 46th street, New York City; J. A. MacMillan, Dayton; C. E. Hooven, Hamilton—both in Ohio. To deal in tires, etc.

Simplex Pneumatic Tire Co., September 8 (Massachusetts), $100,000. W. H. Emeno, president, 32 Tudor street, Chelsea; C. B. Sherwood, treasurer; E. Worthington, clerk, both of 43 Tremont street, Room 305, Boston—both in Massachusetts. Principal office, Boston, Massachusetts. To manufacture and deal in tires, automobile accessories, etc.

Sox Lox Co., September 7 (New York), $10,000. C. W. Egerton; J. W. Hauf; H. A. Gill, Jr.—all of 191 Halsey street, Brooklyn, New York. To make hose supporters.

Standard Tire & Tube Works, Inc., August 28 (New York), $25,000. S. A. Lifshutz, 2061 Berget street; M. Sherman, 277 Glen street; E. Lifshutz, 147 Saratoga avenue—all of Brooklyn, New York. Principal office, Brooklyn, New York.

Stuart Bell Corp., September 14 (New York), $40,000. D. Stein; I. Baurmash, both of 1076 Bryant avenue; A. Joseph, 92 William street—both in New York City. To manufacture tires and automobile accessories.

U-Wanta-Tire & Rubber Co., July 27 (California), $250,000. B. Vale, 57 Post street, San Francisco. Principal office, San Francisco, California. To manufacture tires.

Vetter Rubber Company of Philadelphia, Charles L., September 8 (Delaware), $150,000. C. L. Vetter; H. B. Fox; W. B. Zern—all of Philadelphia, Pennsylvania.

West Coast Rubber Co., January 24 (California), $100,000. H. K. Asherm, 110 Sutter street, San Francisco, California. Principal office, San Francisco, California. To do a general rubber business.

TREASURER OF THE KLEISTONE RUBBER CO.

JOSEPH EVERETT STONE, treasurer and one of the principal moving spirits of the newly organized Kleistone Rubber Co., Warren, Rhode Island, is well fitted for his new undertaking by long experience in the footwear and rubber business.

Pierce, Boston

JOSEPH E. STONE

Born at Marblehead, Massachusetts, in 1876, he was educated in the public schools of that town and began his business career in a general store, where he remained two years. He then entered the shoe jobbing and findings business in Boston and became cashier. After five years he joined the Hood Rubber Co., Watertown, as cashier and assistant treasurer. Fourteen years with this progressive firm gave him an intimate knowledge of rubber footwear manufacture, which was further augmented by seven years as treasurer and a director of the Plymouth Rubber Co., Canton, Massachusetts, where proofed fabrics, artificial leather and rubber heels were the principal products.

Early this year Mr. Stone resigned to organize the Kleistone Rubber Co. in association with M. S. Klein, E. H. Bell and Robert J. Holmes. The modern, well-equipped factory of the Lynn Rubber Co. at Warren, Rhode Island, was taken over and the Spri-Foot rubber heel, the well-known Lynco arch support and sponge rubber heel cushion are being successfully manufactured. The Lynco foot appliances have been on the market for some time and their high standing in the trade will help materially in merchandising the new heel. Output has increased 600 per cent in four weeks and orders are coming in ahead of production.

Mr. Stone enjoys a wide acquaintance in the rubber and shoe trades and has made many friends through his membership in numerous clubs, associations and fraternal organizations, which include the Boston City Club, Boston Chamber of Commerce, Rubber Association of America, and several Masonic bodies and clubs in Boston, Marblehead, Lynn, Swampscott and Belmont

PERSONAL MENTION

Ralph Starr Butler has been appointed advertising manager of the United States Rubber Co., New York City, succeeding R. W. Ashcroft, who resigned some months ago. Mr. Butler has been connected with the United States Rubber Co., for three years, having been first identified with the development department to gather and collate data on market conditions. Previous to this, Mr. Butler was professor of advertising and marketing at New York University.

Harry F. Masman, formerly in charge of the Charleston Traffic Bureau maintained by the city of Charleston, South Carolina, and the Charleston Chamber of Commerce, has taken charge of the traffic work of the National Association of Waste Material Dealers, Inc., whose headquarters are at New York City.

H. Deuster has been appointed manager of the traffic department of the Motor & Accessory Manufacturers' Association. Mr. Deuster brings to his new work eighteen years of railroad experience, twelve with the Erie and six with the Ontario & Western. For four years he was chief clerk of the general

freight department of the last-mentioned railroad and since 1918, chief of the tariff bureau with headquarters in New York City.

John D. Carberry, assistant secretary and assistant treasurer of the United States Rubber Co., has returned from a month's vacation spent at his farm in Vermont and at various points in New England.

Dr. M. L. Axelrod, rubber technologist of the Synthetic Products Co., Cleveland, Ohio, called on the eastern rubber trade last month.

John Young, chief chemist of the Firestone Tire & Rubber Co., Akron, Ohio, was in London, England, last month on a business and pleasure trip.

THE RUBBER TRADE IN THE EAST AND SOUTH

By Our Regular Correspondent

NEW YORK NOTES

The annual Electrical Show will be held in Grand Central Palace, New York City, October 6-16. George F. Parker, who is manager, is confident this year's exposition will surpass any of previous years.

The Compression Tube & Tire Corporation, 318 West 39th street, is the New York City branch of the U. S. Compression Tube & Tire Co., of Tulsa, Oklahoma.

The Auto Pedal Pad Co., Inc., has removed its offices from 794 Seventh avenue, New York City, to 318-20 West 52d street. At a recent meeting, Daniel Sinclair was elected president; Charles Willsmore, vice-president; James Lovegrove, treasurer; and Jessie J. Sinclair, secretary.

The Mesta Machine Co., West Homestead, Pennsylvania, has opened an office in the Singer building, New York City, from which point all its foreign business will be handled. All foreign correspondence should be addressed to the company at the New York office, which will also be the sales office for the New York and Eastern States territory. M. M. Moore, the export sales manager, who has just returned from a several months' European trip, will be in charge.

Dunlop America Limited, Buffalo, New York, has changed its name to Dunlop Tire & Rubber Corporation of America.

The officers of the County Seat Tire Co., Inc., 174 Martine avenue, White Plains, New York, are Fletcher Brush, president and secretary, and Charles Rosenberg, treasurer. During the past ten years Mr. Brush has been tire salesman with the Michelin Tire Co. Ajax Rubber Co., Inc., and Pennsylvania Rubber Co. Mr. Rosenberg is proprietor of the Standard Guarantee Tire Co.'s store at Mt. Vernon, New York.

The Regent Tire & Rubber Co., Inc., 8 Stuyvesant street, New York City, is officered by Henry O. Kahan, president and treasurer; Joseph M. Saunders, secretary; Irving L. Jacobson, vice-president. The company deals in tires, tubes and accessories.

Only the approval of stockholders and completion of the organization work is now required to make effective the merger of the General Chemical, Solvay Process, Semet-Solvay, Barrett and National Aniline & Chemical Companies, five of the country's largest chemical concerns, under the name of the Allied Chemical & Dye Corporation. The outstanding capitalization of the new company is estimated at $175,000,000.

French & Handy, Inc., becomes established October 1 in the business of crude rubber brokers at 347 Madison avenue, New York City, with a branch office at 513 Second National Building, Akron, Ohio. The members of the company are Harold W. French and John L. Handy.

Gove & Co., Inc., will be established October 1 as a brokerage concern dealing in crude rubber, at 25 Beaver street, New York City, by Frederick G. Gove, William Liddell, Jr., and Frank L. Byrne.

The former partnership of Duffy & Sears, crude rubber brokers, 133 Front street, New York City, has been dissolved, S. H. Sears withdrawing from the partnership September 20, 1920. The business will be carried on by Louis A. Duffy under the name of L. A. Duffy, Inc., at the same address. Officers of the new company are Louis A. Duffy, president and treasurer; Ferdinand A. Bonstedt, Akron, Ohio, vice-president; Guy C. Parsons, Greenwich, Connecticut, secretary.

An attractive and useful desk ruler showing the calendar for 1920 and 1921 on one side and the name of the donor on the other is supplied to the trade by George W. Kavanaugh, Inc., 346 Broadway, New York City, dealer in cotton goods for rubber manufacturers.

PENNSYLVANIA NOTES

The B. F. Goodrich Rubber Co., Akron, Ohio, has promoted C. D. Robinson, former manager of tire accessory sales at the Philadelphia branch, to the position of manager of tire sales of the Philadelphia branch territory, covering part of New Jersey, Pennsylvania and Delaware. Mr. Robinson has been connected with the tire industry since 1912, when he became tire salesman with the Diamond Rubber Co. He was successively district representative for the Southern States, the New England territory, and in 1919 took over the position which he relinquished at his recent promotion.

Charles S. Smith, Inc., Philadelphia, Pa., has been appointed distributer for the Amazon Rubber Co., Akron, Ohio.

The F. J. Stokes Machine Co., Seventeenth and Cambria streets, Philadelphia, manufacturer of therapeutical and chemical machinery, was incorporated in July with a capital of $200,000. A new shop, 90 by 300 feet, independent of the original plant, has been erected at Cedar Grove near Philadelphia and soon will begin manufacturing heavy machinery.

The H. H. Robertson Co., Pittsburgh, Pennsylvania, has elected C. D. Mercer, vice-president in charge of sales, W. S. Tallman vice-president in charge of operations, and D. W. Jasper purchasing agent to succeed William E. Coe, who has resigned to enter the railroad supply business with the Buck-Hill Corporation, of New York City.

To facilitate the handling of its business, the Fawcus Machine Co., Pittsburgh, Pennsylvania, has consolidated all departments in its new office building at 2818 Smallman street, adjoining the Pittsburgh works. A downtown office for meetings by appointment will be maintained in suite 1501, Peoples Savings Bank building, where its allied company, the Schaffer Engineering & Equipment Co., is located.

The new officers of the New Castle Rubber Co., New Castle, Pennsylvania, are: W. E. Duersten, president and general manager; H. H. Crosby, secretary; H. W. Smith, treasurer; L. C. Sturgis, general superintendent; W. J. Russel, comptroller. The Lehigh Tire & Rubber Co., Inc., of the same place, operates as sales organization of the New Castle Rubber Co.

Willson Goggles, Inc., formerly named T. A. Willson & Co., Inc., Reading, Pennsylvania, has recently acquired the patents, good will, etc., of Walter Soderling Inc., which manufactured the "Dust-te" respirator. This will now be manufactured at the Willson company's plant at Reading under the personal charge of Mr. Soderling.

SOUTHERN NOTES

The Du Bois Rubber & Tube Co., Chattanooga, Tennessee, has increased its capital stock to $2,000,000. The directorate was increased to 15 members to allow stockholders outside the city more direct representation. Plans for the erection of a modern plant are being furthered rapidly.

THE RUBBER TRADE IN NEW JERSEY

By Our Regular Correspondent

TRENTON NOTES

WHILE the tire industry in Trenton is suffering to some extent, as is the case in other sections of the country, manufacturers are hopeful that conditions will soon reach normal again. The Ajax Rubber Co., Inc., one of the largest tire manufacturing concerns in this section, has laid off nearly 500 hands during the summer.

The United & Globe Rubber Co. felt the slump in its tire branch, but placed the majority of its tire makers at work in the various mechanical departments. The hose, belting and packing departments are very busy at this time and the tire makers were needed to help out. John S. Broughton, president of the company, says conditions are getting brighter and that he believes business will reach normal late in the fall or in the early winter. The Zee Zee Rubber Co., Yardville, laid off about one-third of its working force a few weeks ago. Conditions have begun to improve and the company is gradually taking the tire makers back again. Officials of the company say they do not fear any further lay off from now on.

The Luzerne Rubber Co. will shortly begin work on the erection of the first unit of a new rubber plant adjoining the present works on Muirhead avenue, Trenton. The new unit will be one-story, 60 by 60 feet, of steel, brick, timber and concrete. Plans for the other units will be drawn later. The Luzerne company some time ago purchased a parcel of land adjoining the present plant measuring 200 by 208 feet. The growth of the business has prompted the owners to decide upon additions.

Trenton dealers announce a twenty per cent increase in the prices of all motorcycle and bicycle tires. Motorcycle tires took a jump a few weeks ago and the prices of bicycle tires were recently advanced. The demand for bicycle and motorcycle tires has been greatly increased during the latter part of summer.

The Trenton School of Industrial Art will establish a department of rubber technology. For many years through its course in chemistry and mechanics the school has served the rubber industry indirectly, but as the rubber industry in Trenton has grown to such large proportions it was decided that a course more closely allied with the industry should be offered. J. B. Wishart, a chemist employed by the United & Globe Rubber Manufacturing Co., has been appointed instructor of elementary chemistry. This action on the part of the school authorities has met with the hearty approval of the rubber manufacturers, who contend that rubber workers can gain a thorough knowledge of the business at little expense at the Trenton school and not have to attend institutions in other cities.

MISCELLANEOUS NEW JERSEY NOTES

The Michelin Tire Co., Milltown, New Jersey, has awarded a contract for the erection of a two-story reinforced concrete factory building, 60 by 125 feet.

The Watson-Stillman Co., 190 Fulton street, New York City, manufacturer of pumping machinery, brass and other metal castings, etc., has awarded a contract to H. Wilhelmes & Son, Elizabeth, New Jersey, for a one-story addition at Aldine, New Jersey, to be used as a pattern storage building. The structure will cost about $12,000.

The Howe Rubber Corporation, New Brunswick, New Jersey, which has been cutting down production somewhat for several weeks past, is resuming its normal output and more employes are being placed at work. It is said that the factory will be running on a maximum basis shortly.

The United States Rubber Co. is making a number of improvements to its plant on Little Burney street, New Brunswick, New Jersey. A new plant for refrigeration and circulation of drinking water is being installed. A new sixty-inch, electrically driven, three-roll lining calender is being set up in the mill. A big switchboard is being installed to control the electric power and lighting system, and there will also be a large steam turbine driven generator to produce current for light and power at 550 volts. The power-house equipment will also include a series of transformers. When the work is finished the production capacity of the plant will be about doubled.

The J. Claude English Rubber Co., Asbury Park, New Jersey, suffered a serious loss by fire recently, estimated at more than $15,000 in automobile tires, tubes, etc., which was partially covered by insurance. The upper floor was divided into three store rooms and two other rooms were used as offices. Valuable records and papers were lost. The origin of the blaze is unknown.

The Tru-Matis Tube & Tire Co. has leased the building at 484 Central avenue, Newark, New Jersey, for a term of several years and will use it for showrooms and storage purposes.

THE RUBBER TRADE IN MASSACHUSETTS

By Our Regular Correspondent

IN THE PRESENCE of 1,000 or more persons, a new movement in education was both launched and dedicated with impressive and picturesque ceremonies at Plymouth Rock, September 17, by the State Department of Education and the Associated Industries of Massachusetts.

Following these ceremonies there occurred in the Hotel Pilgrim the first serious conference on the problem of educating non-English-speaking adult immigrants who are employed in the industries of Massachusetts. About 350 representatives of educational institutions and various industries were present to hear addresses by prominent educators in schools and factories. Among those who read papers at the morning session were Mortimer H. Millen, educational director of the General Electric Co. at West Lynn, and A. G. Warren, director of education of the American Steel and Wire Corporation at Worcester. These papers and the discussion which followed showed that the industrial representatives were fully as enthusiastic regarding the movement as the educators and indicated with what encouraging results many big industrial establishments have already begun this educational work. All of the speakers maintained that the education of the adult immigrant was not a one-sided affair by any means, and that much was to be learned from the immigrant.

The industrial representatives had a separate conference in the afternoon at which Cyrus S. Cling, in charge of industrial relations for the United States Rubber Co., presided. The speakers included T. J. Dwyer, superintendent of labor for The Fisk Rubber Co., Chicopee Falls, and Harold L. Robinson, manager of the service department of the Crompton & Knowles Loom Works, Worcester.

John J. Mahoney, State Supervisor of Americanization, submitted a list of propositions from the educators to the industrial leaders for discussion. The educators were also asked to consider eight propositions which embodied what industry expects from the public schools. There was much discussion as to the time to be devoted to the educational work and the cost. Most of the industries seemed willing to allow the workers the necessary time without loss of pay if it was deemed best to conduct the schools in the plants during working hours.

Despite adverse manufacturing conditions common to all New England the close of the factory output of the Boston Woven Hose & Rubber Co., Cambridge, for the fiscal year 1919-20, recently ended, reached a greater volume than ever before. The total poundage reached something over 37,000,000 pounds, as compared with 22,000,000 pounds for the previous year. The best previous mark was 30,000,000 pounds in the year 1917-18.

To encourage employes in production departments not holding executive positions to suggest changes in working methods, equipment, or working conditions that will result in time saving, labor saving, or in improving quality, the Converse Rubber Shoe Co., Malden, is offering cash awards ranging from $5 to $200 for acceptable ideas. Decisions and awards are promptly made by the operating board and rejections are accompanied by the reason why the suggestion cannot be adopted. It is a plan that makes for greater efficiency, more interest and a better spirit of cooperation.

The Mechanical Rubber Manufacturing Co., Andover, is now in production on a small scale and will specialize in the manufacture of small rubber covered rolls for the textile trade. The company was organized in June with the following operating personnel: E. Reed, president, formerly of the United States Rubber Co., New York City; and M. F. Foxon, assistant treasurer and general manager, formerly of the United States Rubber Co., Boston.

The executives and foremen of the Tyer Rubber Co., Andover Massachusetts, held a very successful outing at Marblehead Saturday, August 28, making the trip by automobiles immediately after the factory closing hours. Upon arrival luncheon was served, followed by athletic contests, for which prizes were awarded, and an interesting game of baseball between teams representing the foremen and the office executives was won by the latter team. The outing closed with an old-fashioned clambake.

The Alfred Hale Rubber Co., Atlantic, Massachusetts, has increased its capital stock to 100,000 shares of no par value. Irving M. McQuiston was recently elected vice-president and appointed general manager, effective September 1.

J. W. Hood has succeeded M. S. Connelly as advertising manager of the Hood Rubber Co., Watertown. Mr. Hood is not new to the company, having previously been associated with Mr. Connelly in charge of the firm's tire advertising.

As in other parts of the country tire production is being curtailed in Massachusetts and several hundred tire builders have been temporarily laid off or transferred to other departments. Footwear output is normal, and the demand for mechanicals is reported good.

BOSTON NOTES

Frank A. Vanderlip, one of the directors of the United States Rubber Co., former president of the National City Bank of New York, and one of the nation's leading financial authorities, has consented to conduct a question-box and round-table discussion of financial matters at the Banking and Credit Section conference in connection with the fifth annual meeting of the Associated Industries of Massachusetts at the Copley-Plaza Hotel, Boston, October 29. There will be no set speeches. Mr. Vanderlip will sit down with the members, answer their questions and discuss with them informally the various problems of banking, finance and credit with which they are faced as managers of industrial enterprises.

W. O. Rutherford, vice-president in charge of sales, was a recent visitor at the Boston branch of The B. F. Goodrich Rubber Co. and gave the staff a helpful business talk in which he painted an optimistic picture of the future of the automobile industry.

The Boston office of Charles T. Wilson Co., Inc., crude rubber broker, 516 Winthrop Building, has been closed and the New England business of the firm will be conducted from the main office, 56 Wall street, New York City.

The Davidson Rubber Co., Boston, in order to concentrate and standardize its work, has eliminated certain numbers among its former products and, contrary to report, has to dispose of complete equipment for the manufacture of the discontinued items, especially a dipped goods plant for the manufacture of rubber gloves, including all the necessary outfittings.

The Uehling Instrument Co., New York City, is now being represented in New England by the Smith Engineering & Supply Co., 89 State street, Boston, specializing in power plant equipment. S. W. Smith is president of the concern.

JOHN R. GAMMETER, MECHANICAL ENGINEER

EVERYBODY who studies rubber machinery through the medium of patent specifications is familiar with the name of John R. Gammeter, engineer in charge of mechanical inventions for The B. F. Goodrich Rubber Co., Akron, Ohio. An exceptionally ingenious and prolific designer of labor-saving devices for most branches of the rubber industry, his remarkable career in his chosen field has been that of a self-made man possessed of alertness, initiative, ample capacity for hard work and the determination to succeed.

JOHN R. GAMMETER

Mr. Gammeter is a native of Akron, where he was born May 19, 1876. Following a common school education, he first engaged in the plumbing and heating business. When about twenty years old, however, he returned to Akron and obtained employment with the Goodrich company, with which he has since been identified except for some nine months spent with the Pennsylvania Rubber Co. about 1900.

Dropping off a freight train with only fifty cents in his pocket, the best job he could obtain was pushing a truck at ten cents an hour. But right away he began to search for opportunity. Noticing a number of girls trimming the overflow from rubber stoppers at about $1.50 a day, he set to work making a small machine trimmer. While experimenting with this he carried untrimmed stoppers home in his dinner basket. When alighting from an express wagon one day he slipped and spilled them on the street. The expressman reported the supposed theft to Mr. Gammeter's foreman, who at once began to make inquiries. Mr. Gammeter's reply was an invitation to look at his machine, which was brought to the plant and put in successful operation.

Since then Mr. Gammeter has devoted himself to the improvement of mechanical methods and devices in rubber manufacture. He has invented dozens of important machines, and now has associated with him a large corps of engineers who constitute what is known as the Goodrich experimental department. While in recent years tire machines have had much attention, Mr. Gammeter early became interested in aviation, and during the war invented a balloon valve which was adopted by the United States Army and Navy. He is an enthusiast regarding the future of aviation and was recently named by the Governor of Ohio to serve as a member of the State Aviation Commission.

An ardent sportsman, Mr. Gammeter has a game preserve of two thousand acres near Akron. He is also very much interested in amusement parks and is the owner of the largest tile-lined outdoor swimming pool in the world. He is a keen business man, a good reader of character, and has exceptional control of labor.

His membership in clubs and societies includes the Engineering Society of Akron, American Society of Automotive Engineers, Akron Flying Club, Masonic Club, Fairlawn Heights Golf Club, Portage Fish and Game Association, and the Associated Aviation Clubs of Ohio, of which he is president.

THE RUBBER TRADE IN OHIO

By Our Regular Correspondent

AKRON NOTES

AKRON rubber industries have gone back to the solid business of producing merchantable goods without any frills or interesting accompaniments. The industrial slowing up throughout the United States, which in time made itself felt in Akron to some extent, has made industrial heads look closely over the books and compare overhead charges during the past few years in the rubber industry as compared with similar charges in other industries.

The result has been that when it was found necessary to curtail to meet the demands of bankers, a large part of the men and women on the payrolls of the factories were doing non-essentials as far as actually producing merchandise to be placed in freight cars was concerned. Business had been so good that men were added to the payrolls whenever they could be found, and in time, systems became bulky and heady, and several men were doing work which could have been done by one man.

During the rush, when it was impossible to get half of the work done which was needed to fill the demands of a strong market, there was no time to talk of getting rid of overhead. The demands of business made it necessary to get out goods at any cost. Then came the demands from the bankers that an era of conservation be inaugurated, and as the factory heads went over the books, it was found that thousands of men and women in the factories and offices were non-producing. The factory heads decided that they must either produce or leave.

Many of the men who intended to leave Akron during the periods when the factories were culling were offered positions in the mills. Some of the wiser ones, knowing that in time industry would return to its former level, took advantage of the offers and are to-day working in overalls, awaiting the day when they will again return to their former places. Others decided that the work of producing goods was not to their liking, and they left the city with the stories that have become current in almost all parts of the United States, that the slump was killing Akron.

The culling process has added materially to the efficiency of the factories in Akron. Many factory managers in the city have told the correspondent of THE INDIA RUBBER WORLD that efficiency has increased from 15 to 20 per cent in the production departments and the percentage is even higher in non-production departments. The men now at work in the Akron factories realize that they must produce a fair day's work for a fair day's pay, and the result has been a general speeding up all along the line.

The stories that wages have been cut in the factories can be branded as untrue. The fact is, men who were working in the high wage tire departments have been transferred to other departments and there they have been started at the beginner's wage. In a short time they will reach the highest prices paid in these departments, which of course are not as high as in the tire departments, where the work is heavier.

Strange to say, factory heads reported recently that the sundries, heel, sole and belting business took a remarkable spurt forward at the time the tire industry slackened, and as a result many of the workers were transferred. This is believed by factory heads to have resulted in the stories that wages have been materially cut in the city.

Manufacturers assert that business for the year will show a large increase over business last year when the fiscal year reports are published in November.

Goodyear sales for August amounted to $18,962,009, and for the first eight months of the year totaled $181,115,964, which is more than $12,000,000 in excess of the business done during the same period last year. The sales for the month of August were more than $1,000,000 than in August of last year, when they were $17,925,193. Predictions are made by Goodyear officials that the total business for the year will amount to more than $200,000,000.

The business of Akron's rubber factories is well reflected by other industries in the city. Men in Akron know conditions and would not invest money in building unless they believed the condition of the basic industry of the city to be sound. Building reports at the city hall show that permits have been issued this year to the amount of approximately $17,000,000, as compared with approximately $14,000,000 last year. In these totals are commercial and factory buildings amounting to $3,123,620 for the first eight months as compared with $1,443,435 during the same period last year.

Steam shovels are excavating for two hotels to cost close to $10,000,000. One new hotel has been opened in the city with 175 rooms. The building undertaken last year is going forward. The city state employment bureau finds difficulty in obtaining men for construction work for the city and the county. More than $3,000,000 worth of high-class apartment houses have been financed and are under construction in the residential district and several terraces are being completed for small-salaried people.

These things merely indicate what business men in Akron think of Akron's industries, and it is well known that men with money do not invest good dollars to create sentiment.

The new ten-acre athletic field which The B. F. Goodrich Company is constructing as a playground for its employes ranks with the finest in the country. It is equipped for all leading sports, including trap shooting, canoeing, two baseball diamonds, cricket and soccer fields, 10 tennis courts, hand ball courts, modern running tracks and other features. A concrete stadium is projected, to seat 3,300, with bleacher accommodations for 3,000 more, overlooking the new baseball diamond, which is graded down to professional lines that rival the big-league greens.

The running track encircles the field and has a 25-foot width on the straight-away with 15-foot curves and measures three laps to the mile. Scientific construction enables the track to drain fit for use almost instantaneously after a pouring rain.

Plans include a canoe clubhouse to be built along the adjoining canal. The field will probably be completed in the fall of 1921.

The fifth annual Labor Day outing of The B. F. Goodrich Co. at Goodrich Field, Akron, was attended by fully 15,000 enthusiastic picnickers, the largest attendance so far recorded. Concerts morning and afternoon by the Goodrich band, directed by Clark Miller, were an enjoyable feature of the picnic and much fun was aroused by the efforts of three amateur clowns to mimic the entrants in the various events. Prizes of money and merchandise certificates were awarded the winners in the contests, which included foot races of all kinds, shot put, broad and high jumps, horseshoe tournament, boxing contest, tug-of-war, greased pig chase, and girls' baseball game. Chick Mears captured prizes in seven events and also drew the lucky entry number, winning a $50 merchandise certificate.

Statisticians of The B. F. Goodrich Rubber Co. have estimated that Goodrich tires today cost 25 per cent less and give approximately 100 per cent greater average mileage than they did ten years ago. This good news to tire users is based on comparative price lists and an adjustment basis of 8,000 miles for Goodrich cord and 6,000 miles for their fabric tires. In 1910 a 30 by 3-inch fabric cased tire cost $25.45. Today that size can be bought for $19.10. The 32 by 4-inch tire of 1910 cost $48.65 as against $36.80 in 1920. The 35 by 5-inch tire that sells today at $65.33 cost the user $82.75 in 1910.

More than 50 events with about 1,000 entries made up the Labor Day outing program of The Goodyear Tire & Rubber Co. at Seiberling Field, Akron. A picnic dinner and supper were the main features of the day, with band concerts and community singing in the evening, followed by a dance in Goodyear gymnasium.

The Akron Seamless Rubber Tube Co., 126 West South street, Akron, was incorporated November 7, 1917, under the laws of Ohio, with a capital of $250,000, to manufacture rubber inner tubes for tires. Its present officers are: G. C. March, president; T. E. Barry, secretary; R. B. McReady, treasurer. The board of directors includes also J. W. Hassenflue, Carl Myers and John Hausch.

Recreation at the Miller Rubber Co., Akron, will not slow up during the winter months as plans are being made for a record-breaking bowling season. In addition to having a team in the Akron Industrial Bowling League and the company's Inter-Department League of eight teams, a plan is on foot to organize a second "Class A" league throughout the factory, so that anyone who likes bowling may have a chance to enjoy the game.

John R. Gammeter, head of the experimental department of The B. F. Goodrich Co., who spent the summer in Europe, has returned to Akron. After going through Germany and the other Central Powers he expressed the opinion that it will take many years for these countries to recover from the effects of the world war.

The average American working man is far better off than a millionaire in Germany and the members of the so-called middle classes in France and England, he said in telling of the food shortage which confronts the European nations this winter. In Germany the rationing system is in full force.

There is a better feeling in Germany towards the United States than any of the other Allied nations. This he attributed to the work being done by the Red Cross and other relief agencies. There will be no coal in German homes this winter. All of the fuel is being shipped to France and England, while German business men are in this country buying coal to run their industries at $35 a ton.

Of all the countries he visited, Spain is the best situated economically. There is an abundance of foodstuffs in that country and little industrial trouble. Switzerland is in bad shape, due to its inability to obtain imports. Holland is much better off, while Italy, due to the falling down of her financial structure, is in an even worse situation.

Industrial disputes in France and England are retarding readjustment in those countries. The crops in England are practically all failures, due to excessive rainfall. France will have a bountiful harvest, nearly all of the devastated war regions being replanted.

Frank Busbey, formerly in the publicity department of The Goodyear Tire & Rubber Co., has resigned his position to take charge of the "Cleveland Plain Dealer" bureau in Akron.

H. S. Firestone, president of the Firestone Tire & Rubber Co., Akron, who spent the larger part of the spring and summer in Europe, has returned to his office. He insisted upon coming home when the depression in business felt throughout the country affected Akron, although a number of bankers in New York assured him his presence at the factory was not imperatively required.

The aeronautical department of The Goodyear Tire & Rubber Co., Akron, recently launched "The Navy," a balloon built for the United States Government. It is one of the largest lighter-than-air craft of its kind built by the company here since entering the air field.

Reports from Detroit received in Akron, showing that the automobile manufacturers in that city will produce more automobiles the coming year than have been produced in any year for the past three years, is looked upon by Akron business men as an indication that a revival of the automobile and tire industries is at hand.

Ground has been broken for the new $1,000,000 Wellman-Seaver-Morgan Tractor Co. plant west of Akron near Copley. The company is a subsidiary of the Wellman-Seaver-Morgan Co., manufacturers of boilers and heavy machinery. It will manufacture the "Akron Tractor," according to present plans. Approximately 10,000 men will be employed when the plant is placed in operation.

That thousands of men are not leaving Akron weekly and filing forwarding address, the Akron post office records show. Only 3,784 forwarding addresses to other cities have been filed with the Akron post office since July 1. This number is no higher than during preceding months, and does not exceed the average of about 50 a day.

The Akron Chamber of Commerce has been successful in having the Interstate Commerce Commission modify its rule compelling shipment of all coal available for northern Ohio to the Great Lakes and then to the Northwest, and will receive 40 cars of coal a day for emergency purposes until lake navigation closes. Akron homes were faced by a coal shortage worse than any winter since before the war.

Registration for entrance to the University of Akron took place September 18. Courses for teachers, working people and citizens in general are offered.

The Americanization School of The B. F. Goodrich Co., Akron, opened September 13. All non-English-speaking employes of the company are encouraged to take advantage of its classes.

The structural engineering and architectural work on the new tire plant of the Phoenix Rubber Co., at East Akron, Ohio, has recently been completed under the direction of R. G. Brown, structural engineer of The Associated Engineers Co., Cleveland, Ohio.

MISCELLANEOUS OHIO NOTES

The new plant of the Denman-Myers Cord Tire Co., Warren, Ohio, is now complete and fully equipped. In construction, arrangement and machinery it is one of the most modern tire factories in the country. It will be devoted exclusively to the manufacture of Denman cord tires, and increased production was started September 15. Walter R. Denman is secretary and general manager and Walter E. Myers is president of the company.

Dwight P. Robinson & Co., Inc., New York City, with which Westinghouse, Church, Kerr & Co., Inc., was recently consolidated, has established a branch office in the Home Savings & Loan Building, Youngstown, Ohio, in charge of C. I. Crippen. The company recently moved its Cleveland office from the Leader-News Building to the Citizens Building, in charge of H. P. Clawson who was transferred from Chicago for the purpose.

The Canton Rim Company, Canton, Ohio, which was incorporated for $100,000 on April 27, 1917, increased its capital to $500,000 in March of the present year. The officers are F. G. Graber, president; J. J. Litsinger, vice-president; Grover C. Allison, treasurer; Charles Doerschuk, general manager. The company has just completed an addition, 88 by 120 feet, to its factory at Louisville.

The annual sales convention of the Mason Tire & Rubber Co., Kent, Ohio, was held at the company's home office September 9th and 10th. Several hundred branch managers and salesmen were entertained at a banquet in the new Franklin Hotel. The conference took place in the new addition to the administration offices into which the company is about to move. The new type of cord tire, the "Mason Junior," was introduced to the salesmen, who followed its construction in the factory from raw materials to finished product. This included inspection of the textile division, which now produces from the raw cotton all the cord used in Mason cord tires.

The Mason Tire & Rubber Co., Kent, Ohio, has a large tract of land in the southern part of the city which will be developed by the Mason Housing Co. within the next few years with the building of homes for company employes. The Mason Housing Co. is under the direction of Mason Tire & Rubber Co. officials,

and all the homes built are owned and occupied by Mason employes. The houses are of the most modern type with every convenience. Besides detached houses the Mason Housing Co. has recently overseen the construction of a large 23 apartment terrace located near the textile plant, which will be completed early in the fall.

C. W. McCone has been appointed consulting engineer for the Columbia Tire & Rubber Company's plant at Mansfield, Ohio. Mr. McCone was formerly with The B. F. Goodrich Co., Akron.

The Greenwich Rubber Co., Greenwich, Ohio, maintains a sales office at 27 High street, Akron. This company was incorporated October 29, 1919, under the laws of Ohio, with $250,000 capital, to manufacture Greenwich green tubes, men's and women's belts, and imitation leather. The officers of the company are: C. E. Foutts, president; W. I. Foutts, vice-president; H. H. Taylor, secretary and treasurer. F. M. Newall is general sales manager, and G. E. Whalon, superintendent. W. W Firestone is one of the directors.

The Hercules Rubber Corporation, Cincinnati, Ohio, manufacturer of the "Hercules Airless Punctureless" inner tube mentioned elsewhere in this issue, was incorporated May 27, 1919, with a capital of $1,000,000, to manufacture, compound, sell and purchase rubber products, make tires and tubes, etc. Its present officers are: Edward H. L. Haefner, president; Theodore Heck, first vice-president; Gordon L. Heck, second vice-president; Charles H. Adams, secretary; Elmer W. Vossler, treasurer.

CLEVELAND NOTES

The McElrath Tire & Rubber Co., Cleveland, Ohio, has made application to increase its capital stock from $515,000 to $3,500,000.

The Synthetic Products Co., Cleveland, Ohio, dealer in raw materials for the rubber trade, is prepared to supply standard mineral rubbers in pulverized form to its customers and to give unprejudiced technical advice as to the best hydro carbon to use for a particular purpose.

The Associated Engineers Co., Cleveland, Ohio, announces the opening of a new consulting department intended to serve tire and rubber manufacturers having limited engineering organizations, or those who feel the need of supplementing the work of their own staff with that of specialists of wide acquaintance with current practice.

Oliver Grosvenor

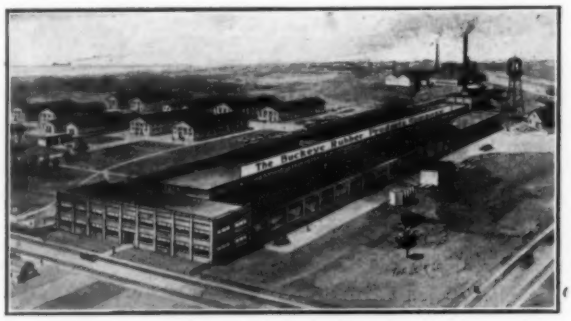
The new department will be under the direction of Oliver Grosvenor who brings to the company the results of many years' experience as a rubber technologist and engineer. He is a graduate in chemical engineering of the University of Michigan and has served in the capacity of technologist and engineer with the United States Rubber Co., general laboratories, New York City; Morgan & Wright, Detroit, Michigan; Mechanical Rubber Co., Cleveland, Ohio, and the Miller Rubber Co., Akron, Ohio. Mr. Grosvenor is the inventor of a method of curing cord tires and of several devices for use in tire manufacture.

Widely circulated reports that the Federal Reserve Board had classed automobiles with "non-essentials" and ordered member banks to restrict the financing of automobile accounts were emphatically denied by Governor William P. G. Harding at the meeting in Cleveland of credit and advertising sections of the Motor and Accessory Manufacturers Association.

"Nothing has been done by the Federal Reserve Board," said Governor Harding, "that reflects in any manner upon one of the greatest industries in the country. It would be a serious thing for any body of men to attack or attempt to destroy a business as firmly rooted and having as many elements of essentiality as the automotive industry. So far as the Federal Reserve Board is concerned, no such attempts have been or will be made."

BUCKEYE RUBBER PRODUCTS ABSORBS POLACK TYRE

The Buckeye Rubber Products Co., Willoughby, Ohio, incorporated last November, has purchased the entire business of the Polack Tyre & Rubber Co., New York and Bridgeport, Connecticut.



Plant of the Buckeye Rubber Products Company

The Polack Tyre & Rubber Co. manufactured exclusively Polack solid truck tires which have been favorably known to truck users since 1899. The manufacture of Polack tires will be continued at the factory in Bridgeport until arrangements are completed to move the equipment to the Buckeye plant at Willoughby, Ohio, where good progress is being made in the installation of equipment for the manufacture of heavy mechanical rubber goods and molded specialties in addition to solid tires.

Charles H. Roth, formerly of the Federal Tire & Rubber Co. and sales manager for The Mason Tire & Rubber Co., is president and general manager. The officers and directors of the company were formerly with The United States Rubber Co., The Racine Rubber Co. and other well-known companies in the rubber industry.

Edwin L. Stimson is general superintendent of the Buckeye plant, coming to the company from the United States Rubber Co., where he spent over 20 years—11 of them as general superintendent.

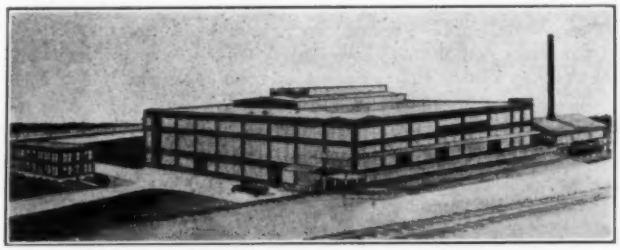
COLUMBIA TIRE & RUBBER CO.'S NEW PLANT

The Columbia Tire & Rubber Co., Columbiana, Ohio, has grown beyond the capacity of its building in that city, and recently recapitalized and increased its capital stock to build a plant at Mansfield, Ohio, for the construction of cord tires exclusively.

The Mansfield plant is constructed according to the newest and most approved design for factories of its type. It is built "U" shaped with open court in the center covered by a dormer roof, this lofty space being used as a mill and calender room. A 15-ton traveling crane here installed handles all heavy material from this department to any one of the three adjacent floors without resorting to the use of the elevator, which will be used only in emergency. The plant is so designed that raw material entering the storeroom on the first floor will pass through the manufacturing process without confusion or crossed operation. Throughout the plant especial attention has been given to healthful working conditions. This is especially noticeable in the curing department, which in many factories is unbearably hot for the workers. This unpleasant feature has been overcome in the Mansfield plant. The power plant is equipped with the latest steam and electric devices to secure economy, and is so arranged

that the engineer in charge has a view of the entire mechanism from any point in the plant.

The new building is located on the main line of the Baltimore & Ohio railroad and has access by industrial switching arrangement to the main lines of the Erie and Pennsylvania railroads, thus giving three main arteries for the shipment of its product. The Columbia Tire & Rubber Co. expects to move its general offices from Columbiana to Mansfield as soon as the new plant starts operations, which will be about November 1. The plant at Columbiana has been in existence for five years and will now be known as Plant No. 2, while the Mansfield plant will be Plant



The Columbia Tire & Rubber Co.'s Plant No. 1, Mansfield, Ohio

No. 1. The Columbiana plant has been building 700 tires and 1,000 tubes daily. The new plant will add 500 to 1,000 cord tires and 3,000 tubes to the company's daily production.

THE RUBBER TRADE IN THE MID-WEST

SEPTEMBER MEETING OF MID-WEST RUBBER MANUFACTURERS' ASSOCIATION

The September meeting of the Mid-West Rubber Manufacturers' Association, held at the Chicago Athletic Association September 14, was attended by 42 members. From the standpoint of discussion it was one of the most interesting meetings held by this association.

The feeling expressed by most of the tire manufacturers was that the worst had already been experienced in the depression in the tire business, that conditions had already improved somewhat and that they would gradually improve until the first of the coming year when normal business was again looked for. President Christie called for expressions of opinion from tire manufacturers representing all parts of the country, and all of them in general agreed with this view. The opinion was also expressed that real salesmanship was again to play a part in the tire business and that hard work would be the solution of selling problems. The

Group of Rubber Men at the Mid-West Outing, held at Cedar Point During August

opinion was also expressed that tire prices were soon due for a radical revision downward, although there was considerable difference of opinion on this point, as some manufacturers felt that the manufacturing trade at large would not reduce prices on account of their raw material having been purchased at such high price levels.

New associate members were elected as follows: The Electric Motor & Repair Co., Akron, Ohio, and The India Rubber World, New York City.

MID-WESTERN NOTES

The annual convention of the National Association of Purchasing Agents will be held at Chicago, October 11-13. A conference of the Standardization Committee of the Association, of which C. H. Money of the Federal Rubber Co., Cudahy, Wisconsin, is a regional chairman, will meet the day preceding the opening of the convention to pass finally upon the recommendation to be made to the association regarding a standardized invoice form.

The Goodyear Tire & Rubber Co., 258 Milwaukee street, Milwaukee, Wisconsin, is authorized to do business in that state as a branch of The Goodyear Tire & Rubber Co., Akron, Ohio, capitalized at $200,000,000. J. C. Sears is manager of the Milwaukee branch.

Briggs & Stratton Co., Milwaukee, Wisconsin, manufacturers of the Briggs & Stratton motor-wheel for attachment to bicycles, etc., has issued $300,000 additional 8 per cent preferred cumulative participating stock par value $100 per share, free from normal Federal tax and entirely free from the state income tax.

Elton S. Boerstler, consulting rubber engineer, Denver, Colorado, was born at Loyal Oak, Ohio, March 27, 1889. Upon graduating from the Barberton High School in 1908, he entered the Ohio State University, from which in 1912 he received a degree of bachelor of science in chemical engineering.

Elton S. Boerstler

Immediately he joined the technical staff of The B. F. Goodrich Co., Akron, Ohio, and was presently in charge of the chemical and physical testing laboratories under the supervision of Dr. William C. Geer. From 1914 to 1917 he was associated with Edwin C. Shaw, works manager, in solving efficiency problems, then followed a year in the cord tire manufacturing and experimental departments. In May, 1918, he resigned to become technical engineer in charge of compounding and development work of the boot and shoe plant of the Firestone Tire & Rubber Co., Akron, Ohio. The following year, while sojourning in Colorado, he saw an opportunity there for the services of a consulting rubber engineer and opened an office in Denver, where he is now associated with rubber experts from Akron.

He is a member of the American Chemical Society, Alpha Chi Sigma Fraternity, and was a member of the University Club while in Akron.

The Ocotillo Products Co. has its main office at 1016 Merchants' Bank Building, Indianapolis, Indiana, and, besides D. M. Bechtel, president, is officered by William M. Jones, vice-president; Charles J. Murphy, secretary-treasurer; and James R. Fleming, counsel.

The American Auto Top Co., Inc., Delphi, Indiana, has been incorporated, with a capital of $200,000, to manufacture glass-enclosed, demountable winter tops for automobiles. The officers are: F. C. Martin, president and manager; J. C. Smock, vice-president; H. B. Wilson, treasurer; W. O. Hefleng, secretary The factory, which is equipped with modern machinery, has a capacity of about 5,000 tops a year.

Curtis Gray of Muskegon, Michigan, originally appointed receiver for the Palmer Tire & Rubber Co. of St. Joseph, was

appointed trustee of the bankrupt concern at the first meeting of the creditors of the company.

The Ford Motor Co., Detroit, Michigan, are now making all the hard rubber parts used on Ford cars from a compound known as Fordite.

Harry Kessinger Co., Joplin, Missouri, importing and manufacturing chemist and manufacturer of toy balloons, has removed from Sixth and Kentucky avenue to Main street at 12th.

The Marion Insulated Wire & Rubber Co., Marion, Indiana, is erecting a three-story-and-basement plant addition, 35 by 60 feet, to accommodate additional equipment recently purchased. The officers of the company are: Robert J. Spencer, Sr., president; C. A. Michaels, vice-president; Robert J. Spencer, Jr., treasurer, and L. A. Lillard, secretary. J. F. Auten is general manager. This company manufactures rubber-covered wires and cables and maintains a Chicago office and warehouse at 541 West Washington Boulevard, Chicago, Illinois.

THE RUBBER TRADE ON THE PACIFIC COAST

By Our Regular Correspondent

DECIDEDLY IMPROVED CONDITIONS in the rubber trade, particularly in the automobile tire line, are reported by general sales agents who have recently toured the section betwen the Rocky Mountains and the Pacific Coast. After three successive years of poor crop conditions, farmers have been successful this year, and their good fortune will be shared by automobile tire dealers and manufacturers. A slight business depression in Portland, Seattle, and Spokane districts, due largely to gasoline shortage, has now been quite cleared up; and tire dealers anticipate a great rush of tourists to the Coast this fall, which will mean a large demand for tires. All the Pacific tire branches are very optimistic over the trade outlook.

LOS ANGELES NOTES

The pony blimp of the Goodyear Tire & Rubber Company of California made two notable trips recently. It delivered to Douglas Fairbanks at Beverly Hills the first four cord tires made at the new Los Angeles factory, and also conveyed Mr. and Mrs. Philip Wrigley twenty-five miles overseas from Catalina Island to Los Angeles. Mr. Wrigley is the son of William Wrigley, Jr., the chewing gum magnate and chief owner of the island. The Goodyear cord tire production is now over 200 a day and will be soon increased.

Football and basket-ball teams have been picked by the employes of the big Goodyear works in Los Angeles, and intensive training was begun last month on the new athletic field north of the factory.

Because of the increased volume of business in aeronautics and the need of increased supervision in the work, the Goodyear Tire & Rubber Company of California has established an aeronautics department with P. K. Coe as manager. Simultaneously a government sales department has been established and will also be under Mr. Coe's supervision. The new manager of Goodyear's Pacific Coast aeronautic activities has had a wide experience in similar lines with the Akron organization. In addition he was in the navy aviation service during the war and holds a pilot's certificate from the Aero Club of America. Since his arrival in Los Angeles in April, he has staged many unique exhibition flights and has greatly stimulated aviation along the Pacific Coast.

The Lap-Lock Tire Co., with an authorized capital of $1,000,000, has been incorporated in Los Angeles by H. L. Averill, Dr. Ross Moore, H. O. Averill, Harry J. McLean and L. A. Cadwalader. The concern plans to build a factory soon in the San Pedro harbor section of Los Angeles and to make rubber tires and tubes. Later it expects also to manufacture other goods of rubber and gutta percha. The company's temporary office is that of its attorney, Mr. McLean, 602 Merchants' National Bank Building, Los Angeles.

What is regarded as a long step taken toward making Los Angeles a great concentration center for cotton is the city's compliance with the Federal Government's requirement that a bond be furnished for the privilege of issuing standardized municipal warehouse cotton receipts. Not only are local bankers thus relieved of the responsibility of supplying funds for the cotton trade on an ordinary mercantile credit basis, but, by the use of bank acceptances under a Federal guarantee that the goods are securely in bond, the credit facilities available for cotton marketing become country-wide rather than local. This is an advantage, it is pointed out, to growers, merchants, exporters and mill men, and will particularly encourage planters of the staple to extend the scope of their operations.

An index of the extent of the rubber tire sales and needs in California is afforded by the latest registration figures issued by the motor vehicle department, showing 450,155 passenger cars, 31,195 trucks and 17,750 motorcycles listed.

E. S. Foljambe, widely known throughout the automotive industry, has joined the forces of the Goodyear Tire & Rubber Company of California, Los Angeles, as a special representative of the motor truck tire department. He will devote himself to educational speech making in "motorize the farm campaigns" and to special sales promotion work. Mr. Foljambe was recently directing editor of the Chelton publications, including the *Automobile Trade Journal* and the *Commercial Car Journal*. A member of the Society of Automotive Engineers since its inception, he became vice-president and a member of the council in 1916, and also holds many honorary memberships in various automobile and trade associations.

E. S. FOLJAMBE

The Goodyear Tire & Rubber Company of California has just opened at its new factory in Los Angeles a free school of tire repairing, in charge of J. R. Wells, manager of the repair materials department, and G. H. Irwin, chief instructor. A complete practical three weeks' course with shop work, lectures and instruction in business methods will be given. Any Far Westerner is eligible to enter the school, which is modeled somewhat after the big Goodyear tire repair school in Akron.

The Goodyear Tire & Rubber Company of California has increased the working force at its Los Angeles plant to over 2,500, working six days a week and twenty-four hours a day in three shifts, and production now runs over 1,500 tires and 2,500 tubes a day. Officials say that by January 1, the plant will be turning out 3,000 tires and 5,000 tubes daily. Construction work on the mills is nearly complete, and the company expects to have installed within a very short time all the machinery ordered from the East. The general offices, which had been for the past ten months on the eighth floor of the Washington Building, Third and South Spring streets, have been moved to the new factory, where the third floor of the warehouse building had been set apart for the corps of 750 workers.

The George W. Eno Rubber Co., of 1026 South Los Angeles street, Los Angeles, is now making red inner tubes in all sizes. The company also makes continuous liners known as Eno Inso tires, and Eno Exso tires to completely cover casings by being vulcanized over treads and sidewalls. The Eno Exso tire-vulcanizing machine is also distributed by the company for applying the "cover-all" to worn casings.

SAN FRANCISCO NOTES

At the recent convention of the National Traffic Officers' Association in San Francisco, Fred S. Wilson, Pacific Coast branch manager of the Thermoid Rubber Co., Trenton, New Jersey, urged the importance of properly-lined brakes and regular compulsory inspection in order to reduce the number of automobile accidents.

The Dutch ship "Arakan," bringing from Batavia a cargo of Far Eastern products including rubber valued at over $200,000, all consigned to the Spreckels Importing Co., went upon a sandspit in a fog off the Point Reyes beach near San Francisco on August 29. The greater part of the rubber was jettisoned, but salvage of the vessel had to be abandoned, as the pounding seas buckled the vessel amidships.

T. H. Wilkinson, manager of the San Francisco branch of the United States Rubber Co., returned early last month from a national conference of the company's branch managers at a New Hampshire summer resort. On his return he attended a conference here of the company's branch managers from Seattle, Portland, Spokane, Salt Lake City, and Los Angeles. Much satisfaction with the present state of the trade in manufactured rubber goods in the West Coast territory was expressed by the sales heads.

The Pioneer Rubber Mills, Pittsburg, California, is extremely busy trying to fill the domestic and foreign demand for its mechanical rubber goods. It has been operating at full capacity twenty-four hours a day for the past three years, and has just completed another large extension to its plant.

SOUTHWESTERN NOTES

"Indian" Miller, a full-blooded Apache, veteran of the Spanish-American war, artist and historian of the Southwest, has joined the advertising department of the Spreckels "Savage" Tire Co., of San Diego, California.

A Boston concern took the first lot of Pima long-staple cotton grown in 1920, paying 85 cents a pound for 200 bales at a recent sale in Phoenix, Arizona. The Arizona crop, which has been almost wholly harvested, had been largely contracted for long in advance by leading automobile tire manufacturers. When cotton was tried out first in Arizona in 1912, only 400 acres were grown. Last year the acreage increased to 87,000, and this year the cotton acreage is 230,000, much more attention being given to Anglo-Egyptian than to short-staple cotton. The average lint cotton yield for the past eight years has been 242 pounds per acre, or a trifle less than half a bale.

That the Southwest cotton-growing district is not immune from the attacks of the boll-weevil and the boll-worm was the warning given by W. H. Robison, secretary of the Arizona Agriculture and Horticulture Commission at a recent conference of such commissions of Arizona and California held in Los Angeles. Mr. Robison, in urging vigilance, said that, contrary to many claims, there is no good reason for believing that the pests which came from Mexico in 1893 and have caused such havoc since in southern plantations may not attack the cotton plants in the reclaimed desert sections of the Southwest. As a result of the conference an active organization will be formed to standardize plant pest prevention and elimination in California, Arizona and New Mexico, as well as to promote the extension of cotton and other areas.

A Phoenix, Arizona, branch has been established, with C. W. McKinley in charge, by the Pacific Rubber Co., of Los Angeles, one of the largest tire distributors on the west coast.

The Spreckels "Savage" Tire Corporation, of San Diego, reports a steady increase in sales, as well as the establishment of several new agencies in the West and Southwest during the past few weeks. The employes of the big rubber concern made a notable record in baseball games during the summer, and the company is planning to aid its workers in a campaign of winter sports.

NINTH ANNUAL SAFETY CONGRESS OF THE NATIONAL SAFETY COUNCIL

RUBBER SECTION MEETING

The Ninth Annual Safety Congress of the National Safety Council was held at Milwaukee, Wisconsin, September 27 to October 1, 1920, at which ways and means for promoting sanitation and freedom from accident, particularly to industrial workers, were considered along many lines, through the medium of sectional meetings devoted to individual branches of industry.

The Rubber Section, under the chairmanship of Sidney M. Schott, held three sessions. Several interesting papers were presented by the safety engineers of several leading rubber manufacturing companies containing much practical information evolved from first-hand study and application of safety methods and devices in actual factory practice. Brief abstracts of certain of the papers are given in the following paragraphs.

Present and Future of Safety in the Rubber Industry

The author summarized the work of the Rubber Section as developing along the following lines: (1) Standardization of accident statistics; (2) education of workmen by means of bulletins; (3) formulation of standard safety rules; (4) engineering standards to ensure safety through construction of plant and machinery; (5) interest and ideas resulting from good programs to be presented at future meetings of the Rubber Section.—Sidney M. Schott, chairman, Morgan & Wright, Detroit, Michigan.

Safety and Sanitation for Rubber Mills and Calenders

In addition to a valuable code of rules for the instruction of mill and calender operatives the paper discussed the most approved practice in the matter of mechanical safeguards, such as quick-stop devices, non-slip floors, proper lighting, ventilation and cleanliness of machines and surroundings.—C. B. Mitchella, The B. F. Goodrich Co., Akron, Ohio.

Vulcanizing Apparatus

The importance of using only vulcanizers of approved modern construction and setting was emphasized. The best practices in their equipment and operation were referred to in detail, also the importance of frequent inspection of all pressure vulcanizers. Proper precautions were given relative to safe handling of carbonic acid gas when employed in the vulcanization process.—F. Scott, superintendent of inspections, Hamlin & Co., New York City.

Industrial Sanitation

The author discussed methods of securing light and pure air as the prime essentials in efficient plant operation. Reference was made in detail to drinking water, cuspidors, toilets, wash room, showers, locker facilities and lunch room accommodations.—W. N. Fitch. Department of Safety and Hygiene, The B. F. Goodrich Co., Akron, Ohio.

Selling Safety in the Factory

In this paper stress was laid on the value of safety to the individual, and the necessity for its consistent adoption through the leadership of the plant manager, assisted by personal work on the part of his department heads and foremen. Effective methods of advertising the importance and value of safety to the individual worker were treated at length. These include bulletins, moving pictures, foremen's meetings, "No Accident" days, safety contests and a court of inquiry on all accidents conducted by the factory manager.—H. T. Martin, manager, Health and Safety Department, The Fisk Rubber Co., Chicopee Falls, Massachusetts.

A Broader Field for Safety Work

The effective agencies for covering the field for safety work in factory operation include (1) the institution of good industrial relations between the management and the employes, (2) maintaining a clean plant, (3) a plant layout department for the standardization of plan, equipment, and internal transportation, (4) industrial engineering department for the control of production

standards and methods of remuneration, such as piece-work rates, bonus plans, etc., (5) employment department, (6) health and safety department in charge of safety campaigns and training operatives in use of safety methods.—A. A. Frank, factory manager, Federal Rubber Co., Cudahy, Wisconsin.

Other papers presented were: Address by J. Newton Gunn, vice-president, United States Rubber Co., New York City, covering the importance and general features of safety in modern rubber manufacturing practice; "Health Hazards in the Rubber Industry," by C. F. Horan, Hood Rubber Co., Watertown, Massachusetts; "Safe Methods of Handling Material," by P. B. Martens, manager, Safety Department, Firestone Tire & Rubber Co., Akron, Ohio.

OFFICERS AND COMMITTEES OF THE S. A. E. TIRE AND RIM DIVISION

The personnel of the Tire and Rim Division of the Society of Automotive Engineers for the current year, of which S. P. Thacher is chairman, is given herewith:

PNEUMATIC TIRES FOR PASSENGER CARS SUBDIVISION: S. P. Thacher, chairman; W. H. Allen, C. I. Bradley, E. G. Hulse, J. C. Tuttle, W. S. Wolfe.

PNEUMATIC TIRES FOR COMMERCIAL VEHICLES SUBDIVISION: W. S. Wolfe, chairman; W. H. Allen, C. I. Bradley, L. R. Davis, E. G. Hulse, J. C. Tuttle.

PNEUMATIC TIRES FOR AIRPLANES SUBDIVISION: W. H. Allen, chairman; C. I. Bradley, A. H. Petersen, S. M. Schott, J. C. Tuttle, W. S. Wolfe.

SOLID TIRES SUBDIVISION: A. Hargraves, chairman; W. H. Allen, C. I. Bradley, L. R. Davis, Hugo Hoffstaedter, A. H. Petersen.

PNEUMATIC TIRE RIMS SUBDIVISION: C. C. Carlton, chairman; W. H. Allen, E. K. Baker, W. N. Booth, Lewis Fine, J. E. Hale, J. W. Holt, S. M. Schott, J. G. Swain, J. H. Wagenhorst.

SOLID TIRE BANDS AND RIMS SUBDIVISION: W. N. Booth, chairman; W. H. Allen, E. K. Baker, C. C. Carlton, L. R. Davis, Lewis Fine, J. E. Hale, A. Hargraves, J. W. Holt.

STORAGE BATTERIES FOR INDUSTRIAL TRACTORS AND TRUCKS

Electric motor vehicles as applied to army use are a comparatively new development of transportation. During the war electrically driven motor trucks were used in this country by the Government for special purposes. That they survived the severe tests to which they were subjected was due in great measure to the rigid specifications under which all their parts were built.

The Government specifications for storage batteries for trucks and industrial tractors call for dependable storage batteries, of the lead-acid type, with normal capacity or service rating of each battery not less than 220 ampere-hours at the five-hour discharge rate. For tractors each battery must consist of 24 lead-acid cells; for trucks, one-half that number. The battery jars are made of hard rubber, nominal thickness 3/16-inch (minimum, 0.175 inch), of compound having a nominal tensile strength of 5,000 pounds per square inch, with an elongation of 6 per cent. The minimum tensile strength permitted is 4,000 pounds per square inch, with an elongation of 7½ per cent. Minimum elongation 5 per cent with a tensile strength of not less than 6,000 pounds per square inch. (For intermediate values of tensile strength, the product of the figures of tensile strength and per cent elongation shall be not less than 30,000.) Covers of jars are of the same hard rubber compound, with molded flat top, not recessed and not below the top of the jar, and are provided with combination filling aperture and gas vent. A minimum amount of sealing wax is used to make the cover gas tight. It is necessary that this wax shall not be ignited easily and shall not flow when heated to 120 degrees F.

Leads from end cells to tray terminals are of No. 0, B. & S. gage, extra flexible rubber-covered cable. The connections between individual cells are burned onto terminals and must be capable of carrying continuously 125 amperes without injury. Bolted intercell connections may be furnished at the option of the purchaser. Tray terminals or connectors when used are of the wing nut type.

The electrolyte is sulphuric acid of 1.275 to 1.290 specific gravity at 80 degrees F. when fully charged. The cells are assembled in trays, each of four cells arranged end to end, with a single tie partition across the center. The trays are of hard wood, painted with two coats of protective paint, fitted with one chest handle on each end and with four lifting irons.

Each battery must be capable of giving not less than either 250 cycles of charge and discharge, or one year of life to not less than 80 per cent of its rated ampere-hour capacity, when operated under service conditions and maintained in accordance with instructions from the manufacturer.

A PLAN TO INCREASE FREIGHT FACILITIES

An urgent appeal to manufacturers and business men to join in making better use of existing railroad equipment as a means of providing an immediate improved transportation service has been issued by the Railroad Committee of the Chamber of Commerce of the United States. The committee points out that shippers can add 535,000 freight cars to the available car supply by loading cars more heavily and loading and unloading them promptly.

As a rule the railroads allow 48 hours free time to load cars and 48 hours to unload them before making any charge for demurrage. If receivers of freight will use only one-half of this time, thus releasing cars in one day instead of two, and in addition will order according to loading capacity, restrict car orders to today's program, avoid the duplication of car orders, and avoid the use of cars for storage purposes, the time that the average freight car spends in the hands of shippers and receivers should be reduced from the present 37 per cent to 22 per cent of its total time, and thus add 360,000 cars to the available car supply.

In 1919 the average load per car was 27.8 tons—only 67 per cent of capacity. If shippers will cooperate with the railroads to attain an average of 30 tons per car, nearly 175,000 cars will be added to the available car supply.

JOSEPH STOKES RUBBER CO. BUILDS IN CANADA

The Joseph Stokes Rubber Co., Trenton, New Jersey, has purchased a site at Welland, Ontario, Canada, having a frontage of 651 feet on the Grand Trunk Railway, upon which a new factory will be located. The contract for the building has been awarded, and the first building is now under roof. The first unit of the new factory will be 120 by 160 feet with a separate power house and office. A spur track will be laid the entire length of the property to serve additional buildings which will be erected as required. The power plant will be 50 by 50 feet, one story brick and timber, and will contain 4 150-horsepower boilers, water heater, two pumps, air compressor and iron tank. There will also be a transformer room and three-story tower, 20 by 22 feet. The products of the company will be hard rubber goods, cells and plates for batteries. It is expected that manufacturing operations will be started by December 1, of this year, at which time 75 people will be placed at work. This number will be increased to 150 by February, 1921. The first unit of the factory will cost $100,000 and it is the intention of the company to erect a big plant later. An Ontario charter has been taken out. The first shipment of machinery is now en route.

IMPORTS INTO MALAGA, SPAIN, FROM THE UNITED STATES during 1919 included 25 kilos of oil and rubber cloth (kilo 2.2046 pounds). American manufactured goods are favorably considered in Spain. The main difficulty to their increased sale in that market is the lack of proper sales agencies and delays in the ocean freight service between the United States and Spain.

CANADIAN MARKET FOR RUBBER GOODS[1]

BRITISH COLUMBIA

THERE is only one firm interested in the manufacture of rubber goods and this is situated at Coquitlan, British Columbia. It has a fully equipped plant and intended to commence operations September 1. The firm has received orders aggregating $1,000,000 in value, largely for shipment to New Zealand. While principally interested in the manufacture of automobile tires, certain side lines will also be made.

HALIFAX

There are no manufacturers of rubber goods in the Halifax consular district, and, as far as can be ascertained, no raw, scrap, waste, or reclaimed rubber is imported for manufacture. The market for rubber tires in Nova Scotia, where there are some 12,000 automobiles and trucks, is good, as the poor roads call for frequent replacements. The tires used are almost wholly of Canadian manufacture. The size most generally used is 30 by 3½ inches, clincher type. Terms of payment are 25 per cent off for cash, net 30 days.

The market for rubber boots and shoes, on account of climatic conditions and such industries as the fisheries and lumbering, is most excellent. This class of goods has, in the past, been obtained from two sources, American and Canadian, but the present tendency, on account of unfavorable exchange, is to place all possible orders with Canadian manufacturers. Rubber boots and shoes are ordered from traveling salesmen, or purchased direct. No statistics of imports or exports are available, but it is known that at present very few rubber boots or shoes are imported. The terms of payment usually given are 30 days, with 2 per cent discount for cash.

There is also an excellent market for belting, and a fair market for other rubber goods used for industrial purposes. Credit is given by the manufacturers for 30 or 60 days, depending on the size of the order and the credit standing of the purchaser. The larger industrial plants buy direct from the manufacturer.

KINGSTON, ONTARIO

In the Kingston district in 1920 there will be a great demand for automobile tires. The prosperity enjoyed by the farmers during the past five years enables them to have a car or two and in consequence the demand for small-sized tires is large. Sizes in demand are 30 by 3½, 31 by 4, 32 by 4, 34 by 4½, 35 by 5 and 37 by 5 inches. Clincher 30 by 3½ and 31 by 4 inches are most popular, while the straight side comes next.

Over two-thirds of the tires sold in this district are made in Canada and those of American make are sold through distributing houses in Toronto. Terms of payment are cash 30 days, varying from 2 to 5 per cent.

The demand for rubber boots and shoes is in the spring and fall of the year. Shipments are made to the retail trade in July and August and payments met in November, when a discount of 2½ per cent is allowed. Owing to the duty and unfavorable exchange American goods are practically shut out of the Canadian market, the only source of supply being Canadian goods. The rubber boots sold are in the following sizes: Men's, 6 to 11; boys', 1 to 5; youths', 11 to 13; and children's, 6 to 10½. Heavy rubber shoes find a sale only in the agricultural sections of the district.

NEW BRUNSWICK

The rubber industrial centers in Canada are Montreal and Quebec. Adverse exchange conditions have practically closed the market to rubber goods from the United States, but there are many kinds of goods that must be imported because Canadian manufacturers are not so far advanced in the making of insulated rubber, scientific apparatus, and miscellaneous rubber goods included under druggists' sundries, but the list is narrowing down and may before long exclude these also.

[1]Consular reports to the Department of Commerce, No. 215, 1920.

The market for rubber tires is considerable. Over 50 per cent of the tires sold in this district are of the 30 by 3½-inch size. Other sizes of tires range from 32 by 4 to 35 by 5 inches, fabric and cord, straight side and clinchers. The usual terms are 30 days and 2 per cent for cash.

It is the general opinion among dealers that rubber clothing of American manufacture is superior to the domestic articles, and that there will be a demand for this class of goods in spite of the added cost on account of duty and adverse exchange. There is a stable market here for American-made rubber packing and fruit-jar rings, because of superiority.

MANITOBA

No rubber goods of any description are manufactured in the Province of Manitoba, the source of supply being the rubber-manufacturing centers of eastern Canada and the United States. The bulk of the tire business consists of Canadian manufactured goods from Ontario factories operated by both American and British capital. Factory branches and warehouses maintained in Winnipeg by the manufacturers handle the retail and jobbing trade and maintain accounting and selling organizations, and a stock of tires. The Provinces of Manitoba, Saskatchewan and Alberta are controlled by the branches at Winnipeg, as a rule, jobbers being found in the larger cities. Terms of payment generally quoted to retail dealers are 2 per cent on the 10th of the following month, or 30 days, net, with the same terms to jobbers, who, in addition, receive a jobber's discount.

The retail price in Manitoba of a Canadian-made tire is approximately 20 per cent higher than the retail price in the United States of an American tire of equal quality. However, American tires are subject to an import duty of 35 per cent, a 2 per cent sales tax recently imposed, and an adverse rate of exchange. A number of well-known American tires are on the market, selling for about 45 per cent higher than in the United States. However, due to increased cost of production, all Canadian tires advanced in price about 20 per cent during the last year.

The most popular sizes in general use are 30 by 3½ clincher, 32 by 4 straight side, the first-named size comprising about 60 per cent of the number sold. In conformity with the action of the Rubber Association of America, the Canadian manufacturers will at once reduce the number of odd and oversize tires now being made and concentrate on three or four standard sizes. The tire market in the province is reported to be very good, but factory branches say there is no unprecedented growth in the volume of sales.

The rubber boot and shoe trade in this province is locally controlled. There was a time when American rubber footwear found a market here, due to distinction and variety of style, but the improvement of Canadian manufactures has resulted in swinging the trade balance. In some lines of footwear Canadian products excel American manufactures in points of workmanship and finish. The market for rubber footwear in this locality is said to be unlimited, some factories being unable to meet the demands of trade, and an ever-increasing demand is expected, particularly for overshoes and rubbers, as many residents of the British Isles now coming to Canada, unused to rubber footwear, will follow the custom of the country, as have thousands of laboring classes from Central Europe.

Rubber goods for industrial purposes are manufactured in eastern Canada and distributed by factory branches and sales managers in Manitoba. Terms of payment are similar to those given jobbers in other rubber lines, and the market is reported as being good.

It is estimated that about one-third of the druggists' sundries made of rubber is imported from the United States. This class of goods includes hot-water bags, air cushions and mattresses, bathing caps, toys, and some surgical bandages. Rubber cement and elastic are also received from the United States.

The Rubber Trade in Great Britain

By Our Regular Correspondent

IN REPLY to inquiries from America regarding the use of the Peachey cold cure process commercially I now refer to the formation of the Peachey Process Co., Limited. The company, which has the nominal capital of £250,000, acquires the patent rights, which cover all important countries of the world, from a syndicate consisting of W. T. Bartholomew, of London; A. H. Shaw, of Blackpool, and J. Higginbotham, of Manchester, who some months ago obtained an option from the patentee to take it up in a specified time. There are eight directors, inclusive of the three above-named, the chairman being Sir John P. Hewett, G. C. S. I., K. B. E., C. I. E. For £20,000 in cash the syndicate sells to the company 27,000 shares of £1 cumulative participating preference shares, credited as fully paid; 43,000 shares of one-pound ordinary shares credited as fully paid; and 100,000 shares of fully paid one-shilling deferred shares. It is stated that the new company is not at present making any public issue of shares and the first work to be undertaken is to enter into negotiations with rubber manufacturers as well as manufacturers of linoleum, leather substitutes, imitation leather goods, upholstery, wall coverings, etc., with respect to their adoption of the new process.

A prominent feature of the company's initial procedure is the acquisition of a suitable building where a demonstration plant will be operated and an experimental laboratory fitted up. Here the patentee, whose exclusive services have been engaged by the company, will carry on the research work which will naturally for some time be necessitated. Sir Arthur Colefax, K. C., on whom the mantle of Lord Moulton seems to have fallen in regard to patent work, has expressed the opinion that the patent is valid. The temporary address of the company is given as at W. J. Bartholomew's offices, 40 Gerrard street, London, W. 1, and no doubt any communications from across the water will receive attention and be passed on to the permanent offices which, it has been stated, will be in the Manchester district.

SOLVENT RECOVERY

The illustrated description of the Lewis solvent recovery system in the June number of THE INDIA RUBBER WORLD has no doubt interested many readers, as the subject is one which is attracting a good deal of attention at the present time. The percentage recovery of solvent is not stated, though a reference is made to maximum recovery. Of course in the development of the impregnated canvas business for cord tires a recovery plant is essential for safety in working, whether it really pays to recover the naphtha or not, but the case is different in, say, a small proofing works. The various systems of recovery now on the market fall into two classes: the first, where the solvent vapors are condensed by compression, and the second, where they are absorbed in creosote or other heavy oil and recovered by distillation.

The main novelty about the Lewis system, which is one of compression, is that the work takes place in an atmosphere which will not support combustion, and therefore all risks of fire or explosion are eliminated. This inert atmosphere consists of flue gas from the boilers, which is stated to consist almost entirely of nitrogen and carbon dioxide. I am afraid that the average flue gas contains more oxygen, carbon monoxide and unburned hydrocarbons than the above statement would lead the uninformed to imagine, but this is not an important matter as regards naphtha recovery, as the nitrogen will always be sufficiently in excess to prevent the formation of an explosive atmosphere. It is not often that any serious accident occurs with naphtha vapors in England, but the sad affair at the Dunlop works in Birmingham last May has brought home to manufacturers the necessity for constant care and supervision.

PROPRIETARY CHEMICALS IN AMERICA

The position which the Rubber Division of the American Chemical Society has taken with regard to the use of trade names for accelerators and compounding ingredients is one which is of considerable import to both sellers and buyers, and it may be taken for granted that divergent views will be expressed as to its tenableness. In selling an article it is, of course, a great pull to be able to say that it cannot be obtained elsewhere, and presumably this is the reason why a special name is adopted for a similar article sold by competitors. Merely to use a short name for a long one when the correct composition of the substance is at the same time disclosed will not appeal to the astute seller who seeks to dispose of an ordinary article at a special price. There always have been specialties on sale to the rubber trade, but the business in these has been by no means of late as in former days because now that chemists are so common in the industry the simple nature of many presumed complicated chemical mixtures or compounds has been easily brought to light. The advent of the organic accelerators with their very long names has, it appears, caused a revival of the proprietary article nomenclature and if, as it has been stated, thiocarbanilide has been offered for sale under six different names and presumably by each seller as a specialty distinct from what could be obtained elsewhere, it certainly seems a course of procedure against the best interests of the rubber industry. At the same time it is not easy to see how any drastic action can be taken.

The invitation to manufacturers and jobbers of proprietary articles to make statements to the Rubber Division on the subject seems unlikely to meet with a ready response, unless it is an expression of opinion that no alteration in existing procedure is desirable. With regard to the invitation to rubber chemists to submit results of their analyses to the secretary of the Division, it may be objected that many of such analyses have been made professionally and that the figures were not intended for the information of all and sundry, though this would not apply to information given by works chemists. The analysis of some proprietary articles sold to the rubber trade is a matter of extreme difficulty, perhaps designedly so.

SELENIUM AND RUBBER

The American Chemical Society has been discussing the possibility of increasing the consumption of selenium and tellurium, two erstwhile rare elements whose chemical characteristics closely follow those of sulphur. According to Victor Lenher the United States in existing plants can produce over 300,000 pounds of selenium and about 125,000 pounds of tellurium annually, figures far beyond the annual consumption, hence the desirability of new markets. One is reminded in this connection of other more or less rare elements, uranium for instance, when it was proposed to open a mine which would produce ten times the amount used in the whole world. At the moment it does not seem as if the rubber trade would remedy the overproduction of selenium, although interesting experiments have been recorded which seem to indicate the similarity of the action of this element to that of sulphur. It is pointed out in the American Chemical Society discussion that much remains to be done, especially along the lines of the use of the chlorides or bromides of selenium and tellurium as accelerators. So far, tellurium does not seem to have received serious attention in the rubber industry. At first sight the harassed rubber manufacturer, seeing selenium quoted at about 12 shillings per pound and tellurium at about 90 shillings per pound, may not wax enthusiastic at the suggestion that he should help in absorbing the surplus production, but in these days of research associations it would be premature to assume that the matter is at an end.

EXPLOSIVES TRADES LIMITED

This amalgamation, effected towards the close of the war between the various hitherto competitive companies making explosives, has invested its surplus capital amounting to about 60 per cent of the whole, in such a variety of undertakings that its title is incongruous and to some extent misleading. Therefore it is shortly to be changed. Substantial holdings have been acquired in the Dunlop Rubber Co., Limited, and its subsidiaries, in the Rotax Motor Accessories Co., Limited, and the business of John Marston, Limited, two makers of the Sunbeam cycles, has been bought outright. A large sum has also been invested in the General Motors Corporation, Inc., of America. Substantial holdings have also been taken in the British Dyestuffs Corporation and the British Cellulose Co., Limited. The latest move is the acquisition of the whole of the shares of the British Pluviusin Co., Limited. This concern was founded about fifteen years ago, if my memory is correct, to make artificial leather at Monton Green, seven miles from Manchester, and the business has made continuous progress. The works are situated close to those of the important Winterbottom Book Cloth Co., Limited, the two, it is understood, having joint financial interest.

A BRITISH RUBBER CLUB

Following an article appearing in the August issue of our new trade periodical *The Rubber Age* (London), I understand that the suggestion to form a rubber club on the lines of that which has now been established some years in America has met with a good response from the trade. A Manchester rubber manufacturer has promised a gift of £100 towards the necessary expenses, to which *The Rubber Age* will add 100 guineas. It is proposed to hold a preliminary meeting during September, either in London or Manchester, and to appoint an executive committee to formulate the scheme which will afterwards be submitted to the trade. Although names of supporters of the scheme are now being enrolled, no one sending his name in will be considered bound thereby in any way until the full scheme is laid before him. I do not know how long the process of formation of the American club took, but I rather imagine that the many matters which are bound to come up for consideration in such a move connected with an old established and withal conservative industry will necessitate an adjournment of the first meeting if the attendance is large and representative as it promises to be.

TRADE NOTES

Among works which have been established in the last few years is that of the Chorley Rubber Co., Limited, of Wildbank Works, Chorley, Lancashire. The promoter was Mr. Bolton, late of the Leyland & Birmingham Rubber Co., Limited, and he is the moving spirit in the enterprise which is concerned with the manufacture of mechanicals, molded and surgical rubber goods. London offices have recently been opened at 103 Cannon street, E. C., under the management of G. E. Watson, late of the North British Rubber Co., Limited.

H. S. Firestone, of Akron, Ohio, recently spent three months in England, occupying a furnished mansion near East Grinstead, Sussex. He has been also a guest of Marshall Stevens, M. P., at Bowdon, Cheshire. Mr. Stevens is chairman of the Trafford Park Estates Co., Limited, and the Xylos Rubber Co., Limited, and his guest has had good opportunities of seeing the great industrial developments which have taken place in the Trafford Park suburb of Manchester.

W. A. Williams, presumably he of the North British Rubber Co., Limited, Edinburgh, contributed an interesting and important article to the "Journal of the Society of Chemical Industry" for August 16, pointing out that for the immediate requirements of the trade there are undoubtedly sufficient supplies of crude rubber, despite the great development of the motor trade. Further with regard to the next few years, he does not predict any real shortage, though there will be a tendency for demand to overtake supply. He deals authoritatively with the cotton position, pointing out the important effect the Arizona output of long-staple cotton will have in steadying the market in Egyptian cotton. He thinks that tire manufacturers will be forced to the new departure of using a proportion of short-staple cotton in these fabrics and any reduction in the life of the tires could be compensated for by a corresponding decrease in the selling price. Naturally the influx of American tires comes up for consideration, and he foresees that the time will shortly come when the American surplus output will be sent over here if our markets are still open, producing a condition of affairs outside the control of the British manufacturer, who will have to depend upon government assistance against this class of competition.

MISCELLANEOUS FOREIGN NOTES

ACCORDING to *The Financial Times*, London, the British Pluviusin Company (1920), Ltd., was registered as a private company on August 27, with a capital of £1,250,00, in £1-shares. The company is to enter into an agreement with Explosives Trades, and to carry on the business of waterproofers, manufacturers of imitation leather, leather cloth, linoleum, paper and cloth combined, tarpaulins, surgical bandages, waterproof cloth, mackintoshes, etc. The registered office is at 12 Newton street, Manchester.

Declared exports of crude rubber from the consular district of Liverpool, England, to the United States for the month of June, 1920, were valued at $74,848.

The British Industries Fair will be held in London from February 21 to March 4, 1921. The Birmingham and Glasgow organizations are cooperating and exhibits will be on view at the former place during the same time as in London. In Glasgow the dates will be from February 28 to March 11. Of the sections interesting to the rubber trade may be noted those of mechanical rubber goods, machinery belting and accessories for motor vehicles, bicycles and airplanes, all in Birmingham.

Reexports of rubber from Great Britain during the first six months of 1920 advanced to £11,237,476, or gains of £5,873,697 over the corresponding period in 1919 and £2,725,377 in 1913.

The decided rise in prices of articles is responsible for the greatly enhanced values of reexports to the United States, including rubber, of which 177,031 centals, valued £2,789,477 were reexported in the first six months of 1913, and 499,088 centals, valued £6,236,086, in the corresponding period of 1920.

Trade between Great Britain and Germany in the first six months of 1913 included exports of rubber totaling 125,899 centals, valued £2,144,704; in the corresponding period of 1920 the quantity was 50,175 centals, valued £541,584.

India rubber goods, not including tires, to the value of $166,381 were imported into New Zealand during the first six months of 1920, as against $112,450 in the corresponding period of 1919, and $177,554 during the first half of 1918.

Walter A. Robinson, general sales manager of the Skipper Rubber Co., Calcutta, India, recently visited an Akron rubber factory. His company is now one of the largest Goodrich distributers in India.

The B. F. Goodrich Co. will operate in Japan under the name of The Yokohama Rubber Co., producing belting, tires, tubes, hose and packing. Belting is already being manufactured, O. K. Butler supervising the work.

The *Gummi-Zeitung* reports from Riga that the rubber industry in that city is still very quiet. It is proposed to resume work in the well-known Prowodnik plant at Riga with the aid of French capital, and the activity of French and English financiers in Letvia indicates a considerable influx of French and English capital in that country. The English financial group of Fortington demanded concessions as to the supply of hemp and wood as security for its credits. The negotiations, however, have not been settled and proposals are now made by a French group which offers better terms, but no agreement has been reached in either case.

During the first five months of 1920 France imported rubber goods valued at 100,000,000 francs; England supplied 55,000,000, America 33,000,000, Italy and Belgium the rest.

THE RUBBER TRADE IN NORWAY

As reported by C. L. Paus, Commercial Secretary to the British Legation, Christiania, Norway, in *The India-Rubber Journal*, London, Norwegian stocks of raw rubber, balata and gutta percha were very scanty at the commencement of the war. As fresh supplies were very difficult to obtain, Norwegian factories were at various times compelled to reduce their production and even to cease operations. After the conclusion of the Norwegian-American Agreement in 1918 the position gradually improved and the manufacturers were once more able to operate upon normal lines. Estimations place Norway's annual requirements at about 150 tons of rubber and 200 to 250 tons of balata and gutta percha, practically all of which is purchased from firms in the United Kingdom. At the end of 1919 there was reported to be little demand for new supplies, as the factories were subsisting on old stocks. One reason for the diminishing demand is the fact that Norwegian production of insulated cable is restricted because of competition from British and American cable manufacturers.

MOTOR CARS AND MOTOR TIRES

Prior to the war, Norway imported motor cars from all European countries in which they were made, and also from the United States of America, which even then held the largest portion of the trade. During 1919 the bulk of the cars imported were supplied by America. On December 31, 1919, the number of motor cars registered in Norway totaled 5,390, in addition to 2,703 motor cycles.

Before the war Norway imported tires mainly from America, Germany, France, Russia and the United Kingdom. It is reported that the British trade was smaller than that of France, Germany and America, and that the American trade was largest. Germany and Russia disappeared from the market early in the war, and supplies were drawn chiefly from France and the United Kingdom. Later, when shipments from France and the United Kingdom became more difficult, the bulk of the trade went to America, which now occupies the leading position. The demand for tires has naturally increased in proportion to the number of motor vehicles in the country, and most of these vehicles were American and therefore equipped with American tires.

Germany supplied most of the bicycle tires imported by Norway prior to the war. A fairly large number were also received from the United Kingdom, while smaller quantities came from France and Denmark. Owing to the increased demand for bicycles Norway's importations of bicycle tires and inner tubes at the end of 1919 is estimated to have been 300,000 of each. Of these the bulk came from the United Kingdom with large shipments also from France. Imports from the United States were not so large.

GALOSHES

On the outbreak of the war, Norway had one galosh factory, namely, Den Norske Galoge og Gummifabrik, A/S., of Mjöndalen, near Drammen. This factory was able to maintain a limited production during the war, but it was burned down last April, and Norway is now dependent entirely upon imported galoshes. It is reported, however, that a new galosh factory, A/S Askim Gummifabrik, has recently been established and will probably begin to produce in 1920.

Norway's total annual consumption of galoshes is estimated to be 800,000 to 1,000,000 pairs. During 1919 imports took place chiefly from America, for neither the United Kingdom, Sweden or Russia has been in a position to export. Imports from England are reported to amount to a few thousand pairs only, as compared with 500,000 or 600,000 pairs from America, while for 1920 large orders have been placed in Sweden and America. It is estimated that owing to the high prices of leather the consumption of galoshes in 1920 will increase very markedly.

MACHINE BELTING

The production of the two Norwegian belting factories is sufficient to supply Norway with balata and leather belting, and with the exception of a British-made balata belting which is said to have an old market in Norway, it is not anticipated that leather and balata belting will be imported to any large extent. Beltings of hair, cotton and india rubber are not produced in Norway, and it is considered probable that there will be a good demand for such goods.

DIVING MATERIALS

The only diving materials manufactured in Norway are canvas overalls, hose couplings and submarine telephone outfits. Complete sets of diving materials of very high quality are stated to be supplied by America, and as quality is of primary importance, price being a secondary consideration, American goods are in demand.

THE RUBBER TRADE IN GERMANY

By a Special Correspondent

The German rubber industry begins to be dissatisfied with the restrictions controlling foreign trade in Germany, and with the necessity of appealing to trading bureaus before articles can be exported, as some of the regulations are entirely out of date and made obsolete by the rapidly changing situation. German rubber manufacturers object to billing goods in foreign money values. This was an advantage while the price of the mark was low but is now a decided disadvantage when mark prices are improving. The bureaucratic control of foreign trading is an impediment to the enterprise of German manufacturers who desire to compete with the other manufacturers of the world. Attempts, therefore, are being made to remove these restrictions and to return to the German manufacturer full liberty of trading abroad.

THE PRIVILEGE OF INTERROGATION

One of the reforms brought about by the recent revolution is the privilege of interrogating ministers which adds so much to the interest of parliamentary proceedings in England. Delegates to the Reichstag are permitted to ask ministers any questions whatever, but it is left to the Secretary of State if a difficult situation should result. The German rubber industry has been concerned for several months over the alleged large imports of rubber tires into Germany, and is now employing ministerial interrogation as a vent to its grievances. It is argued by the manufacturers who are supported in this matter by the factory workers that the wholesale importation of tires creates serious competition, with the result that tire factories have been compelled to curtail production, and for that reason the German rubber industry demands the embargo of tire imports. The representative of the German Department of Commerce, in answering this question, said that the conditions were not serious and that few tires were imported in the ordinary manner while steps had been taken to prevent the illicit trading in smuggled tires. The Government would not place an embargo on the importation of tires unless the German rubber manufacturers would reduce the present price for tires. The hint was taken by the manufacturers and a considerable cut has been made in the

price of tires. As the various reductions that were made in the past have invariably led to a general disorganization of the market, the tire manufacturers decided to bring German tire prices down to the level of the world's markets and thereby avoid the necessity of further reductions in the near future.

THE TRANSPORTATION STRIKE

The rubber industry has suffered together with other industries from the transportation strike which was started with a view to prevent the shipment of military material to the Poles by way of Germany. The strike has spread all over Germany and has compelled the postponement of the merchandise fair in Koenigsberg, Prussia, which was scheduled for the middle of August. This will be held at the end of September provided the transport strike is settled by then. The strike has caused considerable loss to many rubber manufacturers who have not been able to make shipments of goods, the delay and declining prices constituting an inducement for the dealer to cancel his orders.

PRICE REDUCTIONS

The general strike of the consumer which has been employed as a weapon to bring down the cost of living all over Germany has been most effective, being supported by the increased value of the mark which has given the purchaser better value for his money. While the rubber industry is still comparatively busy there are signs of a general decline in the size of the orders and manufacturers see great difficulties ahead to keep their factories going. Some branches of the industry are still working with full time, especially the jar ring manufacturers and those making goods for the electrical industry. To bring the consumer again in the market a reduction of prices has been made by various branches of the industry. The tire prices have been reduced as reported elsewhere in this article and now the hemp hose manufacturers have followed suit. The new reduction brings the cost of this article to a level where it can withstand the competition of the rubber hose which had seriously encroached upon the hemp hose field.

THE LUXURY TAX

The luxury tax is affecting the rubber industry as various articles are subjected to this tax. Pneumatic tires, tire covers and inner tubes for the use of private automobiles are subject to the tax, while tires for airplanes, motorcycles, and bicycles are free from taxation. An exception is made for tires which are used for racing cycles, exhibition cycles and covers and inner tubes executed in colors. Bathing caps, sponge bags, tobacco bags, rubber mats, impregnated cloth, are subject to taxation if made entirely or partly of rubber. Fountain pens are free of taxation if for ordinary use. Ornamented fountain pens and those with gold nibs are taxed. The tax is supposed to be applied without giving special trouble to the taxpayer, and the keeping of ordinary books is regarded as sufficient evidence for the purpose.

TRADE NOTES

The Hamburg rubber market which has been very active during the last few weeks is suffering severely from the irregularity of the exchange values of the mark. When the mark falls in value, up goes the price of rubber; if it should increase, down go rubber prices. As the price differences are sometimes as much as 15 per cent from one week to the other it may easily be understood that rubber importers are not bedded upon roses and the desire is expressed for an early rectification of the German exchanges. All prices are quoted practically upon the basis of immediate payment and delivery of the goods to the buyer.

The Leipziger Gummiwaren Fabrik, formerly Julius Marx, Heine & Co., has distributed a 6 per cent dividend as the result of last year's trading. The annual report states that the factory was busy during the largest part of the year, and there was sufficient raw material available but the coal supplies were insufficient. The export demand has been satisfactory. The directors expect an improvement during the present year.

THE RUBBER TRADE IN SCANDINAVIA AND DENMARK

By a Special Correspondent

THE RUBBER INDUSTRY in Sweden, Denmark, and Norway has been very active all through the war and many new factories were added to those already in existence. With few exceptions the rubber industry of northern Europe is mostly carried on in comparatively small establishments. The necessities of the war and the complete separation from the usual sources of supplies, however, have forced considerable expansion of the existing plants, with the result that the industry has added largely to its productive capacity. Both foreign and domestic capital are employed in these factories. Although foreign competition has increased since the coming of peace the domestic factories find it comparatively easy to hold their own against imports, especially since the market was practically stripped of many articles when peace was declared. This was due less to the lack of manufacturing facilities than to the difficulty of obtaining raw materials, including coal. Sufficient rubber was obtainable during 1919 and the factories succeeded in covering their requirements even in excess of their immediate needs, leading in some cases to reductions in this year's orders.

The first half of the present year shows, for instance, a decline in the imports of raw rubber into Denmark from 367 tons to 273 tons. An increase is reported in the import of most other articles. So the import of pneumatic covers rose from 451 tons to 959 tons; 71 tons of rubber shoes were imported against 40 tons during the first six months of 1919. General all-rubber goods show an increase from 92 tons to 139 tons.

American rubber goods are now in evidence in all three countries, American tires especially being in demand. German rubber goods are being sold again; but not in the same volume as before the war.

The firm of H. Astrup & Co., in Christiania, Denmark, has been sold to a corporation and will be continued under the same name. This firm was formed during the year 1914 to deal in automobile tires and other rubber goods.

The Amerikanska Gummiaktiebolaget, dealer in rubber goods, has increased its capital to 800,000 kroner.

Swedish rubber manufacturers are rejoicing over the discontinuation of the private postal stamps used until now by government offices for franking governmental mail. It appears that in the future postal stamps will be replaced by an imprint of the various offices, made with a rubber stamp. This should bring many new orders to the Swedish rubber stamp manufacturers.

FOREIGN TARIFFS

CANADA

AN ACT to amend the special war revenue act, 1915, passed June 30, 1920, includes a tax on wholesalers of 1 per cent on all parts sold for repairs of automobiles, accessories, tires or repair parts, etc., purchased from Canadian manufacturers or from importers and sold to the ultimate consumer or subdealer or garage.

ARGENTINA

A new Argentine tariff law (No. 11022) was promulgated by executive decree on July 6 and went into effect on July 7, 1920. This law provides for important changes in Law No. 4933 and its supplements, the most important being that included under article 4, which increases by 20 per cent the old official valuations (appraisements), the rates of duty remaining the same. This horizontal increase, which is equivalent to an increase of 20 per cent in duty, does not apply to the articles included in the table below, for which higher increases are specified. In the case of articles for which no appraisement or official valua-

tion is given, the ad valorem duty being assessed on invoice value, as automobiles, for instance, the increase does not apply. Nor would it apply in the case of goods subject to specific duty.

The following table shows the articles for which changes in rate of duty, as well as in official valuation, are provided for by the new law. The previous rates and valuations are given for purposes of comparison. Attention should be invited to the fact that while the rates are ad valorem in form, they are really specific, in view of the fixed character of the valuations, which are not affected by market fluctuations.

Equivalents.—Peso, $0.965; kilo, 2.2046 pounds; liter, 1.05668 U. S. liquid quarts.

Tariff No.	Article	Old Tariff: Valuation in Pesos Per Kilo.	Old Tariff: Rate of Duty P. Ct.	New Tariff: Valuation in Pesos Per Kilo.	New Tariff: Rate of Duty P. Ct.
	Pipes, tubes, hose, elbows, and joints:				
933.	Of rubber, not combined with cloth, except those of English sheets and the like	1.00	25	1.30	30
934.	The same, combined with cloth, with or without wire	60	25	.90	30
935.	Of rubber, in pieces, especially for the manufacture of match boxes	1.50	25	2.00	30
	Rubber:				
1121.	Cushions for billiard tables	1.50	25	2.00	30
1122.	Soft, in sheets, valves, belting, cords, and mats	1.00	25	1.30	30
1123.	The same, combined with cloth or metal	.60	25	.90	30
1124.	Horseshoes, rings, carriage and wagon tires, saw bands, and others	1.50	25	2.00	30
1125.	Tires for automobiles	2.00	25	2.50	30
2536.	Toys, of soft or vulcanized rubber	1.20	25	1.50	30
	Rubber:				
2940.	Refined or soft	1.20	25	1.40	30
2941.	Vulcanized (English sheets and the like, black or red) in the form of bags, belts, cloth, bandages, nipples, trusses, pumps, single or double bulbs for atomizers, sponges, tubes less than 5 millimeters in diameter, and all other unspecified articles used for medicinal use	5.00	25	6.50	30
		Each.		Each.	
2942.	Urethralsounds	0.10	25	0.20	30
2943.	Tubes, 5 millimeters and upward in diameter, stoppers, teething rings, syringes, etc	Per kilo. 3.00	25	Per kilo. 4.00	30
2944.	Lined or combined with cotton, linen, or wool, in the form of belts, hosiery, bandages, and other articles for surgical use	5.00	25	6.50	30
2945.	Lined or combined with silk or mixed silk fabric	$7.00	40	$9.00	50
2946.	Rubberized cloth, such as raincoat silk, etc.	2.00	25	2.50	30
2947.	Hard (ebonite and the like) in the shape of surgical tubes, syringes, pessaries, or any other article for surgical use	3.50	25	4.00	30

GREECE

A bill to modify certain headings in the Greek customs tariff has been introduced. According to the new law, No. 2152, the duties on rubber goods will be as follows:

Equivalents.—Drachma, 19.2 cents (nominal value); oke, 2.8 pounds avoirdupois; dramion, 0.111 ounce.

Tariff No.		General Tariff, Drachmas	Conventional Tariff, Drachmas
72*b*.	Metal wires covered with rubber or gutta percha, per 100 *okes*	10.00	5.00
325*c*.	Pieces, sheets, bands, bars, pipes, etc., of rubber and gutta percha, mixed or not with other materials, and hat rim of cotton steeped in gum, per 100 *okes*	280.00	140.00

In addition to the above amendments, the law provides for a municipal tax to be levied and collected on imported goods at the same time as the customs import duty. Imported goods, having once paid municipal (octroi) tax, are not again subject to such tax when transported to other municipalities.

The municipal tax on goods subject to import duty (the above, therefore, too) is fixed at 25 per cent of the State import duty.

Below is a list of rubber goods exempt from import duty, but liable to municipal taxes at the specified rates:

Tariff No.		Municipal Tax, Drachmas, per 100 okes
221*d*.	Packing of asbestos mixed with other substances	20.00
325*a*.	Rubber and gutta percha, raw and refined	50.00
b.	Threads of rubber and gutta percha	75.00
d.	Diving suits	10.00

POLAND

Among the articles classed as "luxury" goods, of which importation is prohibited, are mentioned waterproof and rubbered garments, caps, overcoats, mantles, etc.

GERMANY

A German law of July 21 authorizes the German Government to apply the conventional tariff rates to goods of any origin. A government proclamation issued under the above law, dated July 28, and effective August 6, provides that where the customs treatment of imported goods is established by a treaty or convention, this conventional treatment is to be applied to similar goods from whatever country they may be imported.

THE RUBBER INDUSTRY IN THE NETHERLAND EAST INDIES

By a Special Correspondent

THE *Archief voor de Rubbercultuur* of December, 1919, publishes a comparison of production costs in West Java and the Federated Malay States. Although the figures in the first case are for 1917 and in the latter for the first half of 1918, they may prove interesting particularly as the conclusions give food for thought at a time when Malayan planters are fighting for higher prices for their rubber.

Data for the Federated Malay States cover 193 estates; the average cost price for 107 was about fl. 1.06 (florin=$0.40 United States currency), and for 86, fl. 1.61 per kilo of rubber.

Placed side by side the average costs for West Java and the Federated Malay States are as follows (one bouw equals 1.75 acres; one kilo equals 2.2 pounds):

		West Java	F. M. S.
(1)	Average yield per bouw per annum *kilos*	302	225
(2)	Average costs per kilo of rubber for upkeep of bearing area	fl. 0.1388	fl. 0.2942
(3)	Tapping, preparation, packing, transportation per kilo of rubber	0.5477	0.5902
(4)	General expenses	0.2537	0.4222
	Average cost per kilo of rubber	fl. 0.9402	fl. 1.3066

Special taxes due to circumstances have not been included in the above figures. The cost given above is the f. o. b. price to the nearest port and does not include insurance, freight and office overhead.

In the above costs, the points to be noted are: general estate labor is cheaper in Java; tappers in Java will tap only and not do extra work as the contract workers in the Federated Malay States do. On the other hand, the planter in Java has no recruiting costs, while salaries for the European staff are higher in the Federated Malay States and, last but not least, the yields in Java appear to be higher than in Malaya.

Now the number of West Java estates considered was only 26, and then there was about a year's difference in time. As production increases each year, the figures for West Java would have been still more favorable if they had been given for 1918 as was the case in the Federated Malay States.

The writer of the article concludes with the significant remark that since costs are much lower in Java, the rubber industry is on a firmer economic basis than is the case in Malaya; consequently if prices should decline, Java estates would still have a margin of profit, whereas the Malayan estates would not.

PLANTERS' DEMANDS

The Planters' Union here has asked for a general increase in salaries amounting to 100 per cent. The employers have suggested that since a good many estates have already raised salaries, and as it is difficult to lump estates varying greatly in situation, climate, etc., where conditions consequently differ greatly, minimum salaries should be fixed.

RUBBER TREE SELECTION

Of late, much attention has been given to selection in order to increase the production. Highest producers have been selected as sources of seed or budded stock for new plantings. However, it has been found that a good many of the best yielding trees develop brown bast, and their offspring would naturally inherit the same tendency. In this connection Dr. R. D. Rands read a paper before the annual meeting of the Union of Experiment Station Personnel, held at Buitenzorg, Java.

To eliminate such susceptible trees, Dr. Rands proposes tapping superior trees as often as 5 to 6 times a day. This severe overtapping would naturally induce brown bast in the susceptible trees, and those trees remaining healthy would serve as a source of resistant propagating stock. Experiments were carried out which resulted in the isolation of a high-yielding tree resistant to brown bast. A section of the Economic Garden has been planted with offspring from this tree for the purpose of future study.

NETHERLAND INDIES RUBBER FACTORY

The 1919 report of the above concern shows that the company has not had a very favorable year. The capital has been increased from fl. 750,000 to fl. 2,500,000, in order to permit of expansion, as at present the general expense is too high for the amount of goods produced.

Conditions brought about by the armistice were responsible for fewer sales, while prices had to be lowered in order to permit competition with imported articles, of which there were large quantities in the Netherland East Indies. Further, large sums had to be turned over to buyers of automobile tires and tubes, as it was shown that factory defects developed. In fact, the manufacture of automobile tires had to be temporarily stopped from January 1, 1919. Although many defects were found in solid tires, it has been found that the quality is improving and therefore the manufacture of these will continue.

IMPORTS OF TIRES

The following figures show the quantities of automobile and bicycle tires imported into Java and Madura.

AUTOMOBILE TIRES

	April		Four Months Ended April	
From—	1919	1920	1919	1920
Netherlands ..... (*number*)	300	253	325	454
Great Britain	614	2,152	1,269	4,237
France	9,437	4,154	17,426	6,326
Canada	....	....	....	1,022
United States	6,910	3,217	15,505	13,705
Singapore	389	578	3,150	3,761
Japan	270	3,616	17,477	14,195
Elsewhere	728	9,626	4,232	6,699
Totals	18,648	23,596	59,384	50,399

BICYCLE TIRES

	April		Four Months Ended April	
From—	1919	1920	1919	1920
Netherlands ..... (*number*)	948	....	948	6,495
Great Britain	....	588	441	1,673
United States	650	215	1,004	736
Singapore	200	50	200	5,207
Japan	295	30,504	15,058	158,701
Elsewhere	8,000	208	8,110	208
Totals	10,093	31,565	25,761	173,020

THE RUBBER INDUSTRY IN THE STRAITS SETTLEMENTS

ACCORDING to the report of Consul Edwin N. Gunsaulus, Singapore, the steadily increasing foreign trade of the Straits Settlements, both in imports and exports, during recent years is to a large degree traceable to the remarkable industrial development that has been taking place in Malaya, especially in the cultivation and sale of rubber, which now far outrivals tin as one of the two basic industries of this country.

The great bulk of the rubber production originates in the Malay Peninsula. The Straits Settlements derives its importance as a market for plantation rubber from the fact that practically the entire rubber trade of the Federated and Non-Federated Malay States is conducted through its ports, Singapore and Penang, and is included on this account in the trade statistics of the colony.

As illustrating the development of the rubber industry, it only needs to be mentioned that the Malayan exports of this product increased from 430 tons in 1906 to 108,305 tons in 1918, and the value from $1,200,000 to $87,758,729. Imports into and exports from the Straits Settlements of Pará rubber in 1917 and 1918 were (1 picul = 133⅓ pounds):

	1917		1918	
Countries	Piculs	Value	Piculs	Value
Imports from—				
Malay States	928,000	$59,903,578	1,351,000	$54,413,409
Dutch East Indies.....	124,000	7,568,674	328,000	12,693,169
All other countries.....	40,000	2,387,021	59,000	2,336,498
Totals	1,092,000	$69,859,273	1,738,000	$69,443,076
Exports to—				
United Kingdom	251,000	$18,201,397	159,000	$7,573,316
United States	1,162,000	84,338,741	1,334,000	64,712,734
All other countries.....	210,000	15,930,196	348,000	15,472,679
Totals	1,623,000	$118,470,334	1,841,000	$87,758,729

The following table gives the values of raw and manufactured rubber imported into the Straits Settlements in 1917 and 1918:

	1917		1918	
Article	Quantity	Value	Quantity	Value
Raw Materials				
Gutta, inferior .....*pounds*	7,258	$692,342	4,901	$533,156
Rubber, Pará	57,483	68,859,205	91,496	69,443,015
Manufactured Articles				
India rubber goods.....	.....	121,551	.....	158,040

By countries, imports of india rubber manufactures were as follows:

Articles and Countries	1917	1918
India rubber goods, including tires:		
United Kingdom	$304,164	$348,414
Japan	181,616	399,854
Siam and Siamese States	1,561	5,365
United States	69,534	298,627
France	252,750	154,941
Italy	201,538	78,209

In imports from the United States appreciable gains appear in rubber tires.

The outstanding feature of the export trade of the Straits Settlements as concerns the buying countries is the premier position held by the United States as a purchaser of Straits products and shipments for 1917 and 1918. This is due to a large extent to the extensive buying of crude rubber by American manufacturers.

The qauntities and values of raw rubber and gutta percha exported during 1917 and 1918 are given below:

	1917		1918	
Articles	Tons	Value	Tons	Value
Gutta-percha	3,875	$1,557,328	3,140	$2,610,073
Gutta, inferior	5,148	432,767	1,178	124,960
Rubber, Pará	95,476	118,470,176	108,305	87,758,729

A large advance in value is found in gutta percha, while there is a decrease in rubber. In the instance of gutta percha the export value has increased while the quantity exported shows material decrease.

The following table shows the value of rubber and gutta percha exported during 1917 and 1918 and the principal countries to which these products were shipped:

Articles and Countries	1917	1918
Gutta percha:		
United Kingdom	$850,000	$2,124,057
Canada	.....	44,895
France	23,000	43,909
Italy	20,000	11,445
Japan	30,000	22,755
United States	600,000	362,736
Gutta, inferior:		
United Kingdom	5,476	5,717
Canada	.....	6,365
Japan	18,124	16,010
United States	399,480	89,959
Rubber, Pará:		
United Kingdom	18,201,000	7,573,186
Canada	6,554,000	5,499,199
Australia	.....	852,562
France	1,034,000	1,438,670
Italy	1,236,000	2,234,450
Japan	3,610,000	5,365,920
United States	84,000,000	64,719,596

Declared exports of rubber and gutta to the United States from Singapore for the years 1917 and 1918 were as follows:

Articles	1917 Quantity	1917 Value	1918 Quantity	1918 Value
Gutta, Hongkong.*pounds*	.....	.....	67,469	$14,647
Gutta, Jangkar	45,733	$5,398	1,598	9,861
Gutta, Jelutong.....	10,108,209	871,969	4,043,625	338,916
Gutta percha	2,212,719	281,940	848,506	173,446
Gutta, reboiled	304,659	30,008	19,661	4,648
Gutta, siak	2,346,405	314,286	1,429,397	201,912
Gutta, untreated	764,169	51,950	.....	.....
Rubber, Pará	167,742,830	87,232,774	173,968,167	62,372,809

The United States was the largest purchaser of rubber from the Straits Settlements, while the United Kingdom led in the purchase of gutta percha.

Exports of rubber to the United States as declared at Penang, were 25,474,672 pounds valued $14,103,936 in 1917, and 21,472,640 pounds valued $5,479,827 in 1918. The decrease in export values was largely due to the sharp slump in the price of rubber during the year.

THE RUBBER INDUSTRY IN MALAYA

By a Special Correspondent

THERE is a general feeling of soreness here among rubber producers over the fact that whereas most articles have risen in price, rubber is a great exception. The opinion is that this has been caused by outside control of the market, many openly saying that America is controlling the market and is refraining from buying until prices suit her.

Various remedies have been offered by those that feel most strongly about the matter. All clamor for some kind of combination. One suggests that "the Rubber Growers' Associations obtain the combination of all members of their association to fix a minimum price of 2*s.* 6*d.* per pound for the lowest grade of rubber." Another wants to fix the price at 4*s.* per pound, yet another calls in the help of the Government which is to buy up all rubber at a fixed price, ranging from 80 cents (Straits) downwards and is to refuse to let a single pound out of the country under 5*s.* per pound. This latter scheme reminds us somewhat of the famous Brazilian rubber valorization scheme, which cost the government a mint of money and was such a ghastly failure.

After all this feverish agitation, the thoughtful editorial in the issue of July 31 of the *Malayan Tin and Rubber Journal* is particularly gratifying. The editor points out that if the two-thirds of Malayan planters belonging to the Rubber Growers' Association formed a combine, an equally strong combine of buyers, watching proceedings, would buy up as much rubber as possible before the planters' combine had a chance to operate, and would be able to go on for several months with these purchases. Meanwhile, the producers' combine would not find a market for their high priced rubbers; the planters would have on hand an increasing stock of rubber—an article extremely liable to deterioration. Thus after four or five months, they would be only too glad to sell at any price.

Of course, all producers are not joining the alarm; the following extract from a recent company report is further proof that there are still people capable of seeing things as they are:

> The really remarkable thing is that, with the world in its unsettled state, the demand for rubber should have kept pace with the greatly increased production. Here, I think, the low prices have been an aid to the industry; at least they have scotched the synthetic bogey. . . . . Low prices have led to the most careful thought being given to working expenditure, until today well-managed estates can produce at a price never thought of in the good old days of 5-shilling rubber.

SELANGOR RUBBER COMPANY'S MAJORITY

The Selangor Rubber Co., Ltd., has just celebrated its 21st birthday. Begun in 1899, it claims to be the first British company formed to cultivate Pará rubber on a commercial scale. It bought 3,927 acres of land in Malaya, approximately 200 acres of which had been planted by the former owners in 1898. At present the company owns 2,631½ acres, of which all that could be used for rubber, 2,511½ acres, has now been planted.

The first rubber sold was a small consignment of 342 pounds, which brought 6*s.* 1¼*d.* per pound. The costs and yields of so old a company are undoubtedly interesting. The total yield was 888,830 pounds of dry rubber during 1919; the cost of production alone was just over 6¼*d.* per pound, against 6½*d.* per pound the year before. As for yields per acre, some of the 21 year old rubber gave up to 500 pounds an acre, and none of it gave less than 350 pounds. Some of the newer rubber fields yielded well over 650 pounds per acre.

Against these figures it is interesting to put those of another well-known company—the Seafield Rubber Co. Here the production costs, including export duties, was about 8*d.* per pound, against 8⅛*d.* the year before. The older portion of the estate covering about 826 acres yielded 634 pounds per acre, one field giving 816 pounds per acre. The new portion with an acreage of 1,248 averages 501 pounds per acre.

Production on most estates in Malaya ranges from about 450 pounds to 250 pounds, while all-in costs are generally around 1*s.* per pound. On some of the newer estates all-in costs run as high as 1*s.* 5*d.* per pound.

ALTERNATE DAILY TAPPING

Together with prices, the labor shortage and alternate daily tapping are being discussed a good deal at present. The number of planters using the alternate method is far greater than many have thought. Their reasons for favoring the method coincide pretty well; the general opinion is that by this system the amount of labor required is reduced, while the percentage of first latex rubber is considerably higher, one planter giving his percentage of first latex as over 87.6. Then there is a reduction in costs, while it is further pointed out that lighter tapping favors the health of the trees.

NEW RUBBER PACKING CASES

A new solid fiber telescopic chest for packing rubber is being introduced into the Far East by the Zellerbach Paper Co., of San Francisco, California. These chests are sent out in the shape of sheets and are riveted, packed, wired, and made ready for shipment at the plantation.

At a demonstration held in Singapore, 250 pounds of sheet rubber were packed in such a chest without much pressure. In a Borneo, Momi or Venesta chest but 200 to 250 pounds can be packed. To show the durability and resistance to breakage of these packages two fully packed chests were thrown to the ground from a height of 21 feet. They proved to be resilient as a rubber ball, and except for a small clip flying off, showed no damage. The same test applied to a Borneo chest resulted in the chest being smashed to pieces. Two Venesta cases thus tested were also badly damaged. Although the new case, which is made of a composition of fiber and jute, is somewhat more expensive than the other cases, it is felt that its advantages outweigh this objection.

THE RUBBER INDUSTRY IN THE FEDERATED MALAY STATES

According to the reports of Consul Edwin N. Gunsaulus, Singapore, Straits Settlements, while the import and export trade figures of the Straits Settlements embrace practically all the foreign trade transactions of the Federated Malay States and the entire Malay Peninsula, as well by reason of the fact that essentially all of the incoming and outgoing products having to do with the Malay States pass through Singapore, Penang, and Malakka, the commercial and trade importance of the Straits Settlements depends to a great extent upon the development and progress of the hinterland, known as the Malay Peninsula. The development of the Malay Peninsula, particularly that portion included in the Federated Malay States, is well known and

for several years the Peninsula has led all other countries in the production of crude rubber.

The exports of rubber from the Federated Malay States were as follows for the last five years:

	Tons
1914	30,697
1915	44,523
1916	62,764
1917	79,831
1918	78,283

Stocks in the Federated Malay States at the end of the year were still somewhat heavy.

An outstanding feature of the year was the success attending the extraction of gutta percha by native methods from taban trees.

THE RUBBER INDUSTRY IN CEYLON

Special Correspondence

THE CAMPAIGN begun by F. S. Elson to organize some kind of union of planters to improve the lot of the working planter has given the Planters' Association of Ceylon a much-needed jolt. Once fully aroused to the real need of reforms, this association has lost no time in getting into immediate and sympathetic touch with Mr. Elson and his associates. As a result it is gratifying to learn that discussions to reconstitute the Planters' Association have been under way, and that the need for a separate organization to fight for the working planters' interests has practically vanished.

It has been proposed to divide the interests at present represented by the General Committee of Planters' Association of Ceylon into four heads: (1) The interests of the companies; (2) interests of private proprietors; (3) interests of working planters, including assistant superintendents; (4) a general committee to watch over, as at present, politics in its widest sense.

Furthermore, resolutions have been passed with regard to salaries, pensions and furloughs. With reference to the latter, the opinion was that all planters should be entitled to six months' leave with full pay after five years' service in an up-country district, or four years' service in a low-country district; employers should be asked to pay annually to the Ceylon Planters' Association a sum equal to one-fifth, in the case of an up-country planter, and one-fourth in the case of a low-country planter, of the six months' furlough full pay; that a similar method should be adopted for payment of the cost of passages to England.

RUBBER CONTRACT CASE

Graham McPhillips, Limited, of Singapore, which, during the latter part of 1919 had a branch office at Colombo, sued the General Rubber Co., also having a branch office at Colombo, for the recovery of 32,340 rupees as damages suffered by plaintiff in consequence of an alleged breach of the terms of a contract dated September 12, 1919, for the sale of rubber. By the terms of this contract the General Rubber Co. was to supply 75 tons of rubber, to be delivered in October, November and December, 1919, at the rate of 25 tons per month. Payment was to be made by bank demand drafts on London. Any alteration in method of payment which might come into force during the period of contract would be applicable to the contract.

The plaintiff company claimed that, for the delivery of the 50 tons during November and December, defendants insisted on payment in rupees and refused to accept demand drafts on London. Plaintiffs paid in rupees under protest and were compelled to cancel the cross-exchange contract with the bank, thereby suffering a loss of 32,340 rupees.

Judgment was that after October, under the altered conditions of payment at public sales, the option of payment in sterling draft was no longer in force. Consequently, the defendants were entitled to payment in rupees, and plaintiffs could not claim damages. Plaintiffs' action was dismissed with costs.

PASDUN KORALE SHOW

At this recently held agricultural and horticultural show, planters of the Kalutara district lent their aid. Among the exhibits were rubber sheets. The gold medal for unsmoked diamond sheet was won by the superintendent of Millekanda.

DEFECTS IN PLANTATION RUBBER

SPOTS ON SHEET RUBBER

THE spots that are sometimes noticed on plantation sheet appear as clear, transparent and rather darker places on the sheets, varying greatly in size, form and number, but distinctly visible, particularly when held up to the light. With a few exceptions, both sides of the sheet are similarly spotted, showing that the defect extends through the sheet.

Experiments show that these spots occur when sulphite or bisulphite or a combination of both is used. Small amounts of these chemicals do not affect the appearance of the sheet; but when larger amounts are employed, the spots become evident. When a greater amount of curdling or coagulation of the latex takes place, more of the sheets are spotted and the spots are larger and darker.

The use of anti-coagulants other than sulphite and reduction or avoidance of bisulphite prevent spots from appearing.

RUSTINESS IN SMOKED SHEET

A damp atmosphere is particularly favorable to the development of rustiness, which is indeed most prevalent during wet weather. The degree of moisture in which sheets hang shortly after rolling is of the greatest importance. In wet weather, sheets taken immediately after rolling into a drying room at a temperature of 104 to 140 degrees F. never become rusty, while air drying (at room temperature) sometimes produces rustiness. It is also increased by rolling the sheet a longer time after coagulation. An increase in rustiness was caused in several experiments by rolling sheets twenty-four hours after coagulation instead of directly.

One experimenter recommends soaking the sheets in water to prevent rustiness. However, another finds that this promotes rustiness. Even on sheets soaked in water for seven days rustiness can be produced. Rapid surface drying is regarded as the best method to prevent rustiness caused by the decomposition of serum substances.

MOULDY RUBBER

Of late there has been considerable complaint about rubber that has left the estate quite dry and arrives in a mouldy condition or covered with colored spots. A few years ago, the remedy was sought in oversmoking. At present, however, with an overstocked market, buyers have been able to pick and choose and oversmoking means losses, so that a new remedy must be found.

Mouldiness is caused by damp conditions of packing or dampness during transportation. Thorough smoking and care in keeping the rubber dry afterward is the best method for preventing mould. Cases should never stand on a cement floor, but be placed at least three or four inches off the floor. Other remedial suggestions are: the separation of factory and packing room; packing rubber in lead-lined cases; redrying the rubber at the coast; the making of black rubber instead of sheet and baling this. It is said that soaking unsmoked sheet for 48 hours will prevent mould. In the case of smoked sheets, soaking 5 to 20 hours before smoking is advised.

RUBBER AND MANUFACTURES OF RUBBER WERE IMPORTED INTO THE Dominican Republic during 1918 from the United States to the value of $137,804; from the United Kingdom, $116; from France, $60; from Porto Rico, $5,904; and from all other countries, $92, a total of $143,976 for the year.

Recent Patents Relating to Rubber

THE UNITED STATES

ISSUED APRIL 13, 1920

NO. 1,337,009* Hard rubber dye stick with soft rubber plugs for ends. W. V. Foley, assignor to India Rubber Co.,—both of New Brunswick, N. J.

ISSUED AUGUST 3, 1920

1,348,163 Rubber outer sole for shoe, with heel rest intended to be concealed when heel is attached. G. Ferguson, Wollaston, Mass., assignor to United Shoe Machinery Co., Paterson, N. J.
1,348,165 Cushion wheel. F. A. Frommann, Chicago, Ill.
1,348,200 Tire composed of rubber of different degrees of hardness for the main portion and for the edges of the tread, integrally combined. W. W. Beaumont, London, England.
1,348,211 Fountain-pen-filling device for bottles, with rubber bulb. A. T. Cross, Providence, R. I.
1,348,313 Water reservoir to be used in tidal movement power system, having tubular connection to outside motor. V. Paesano, Isola Siri Superiore, Italy, assignor of one-half to P. Di Milla, Boston, Mass.
1,348,401 Rubber udder attachment for milking-machines. P. A. Frimand, Wilmette, assignor to the Burton Page Co., Chicago—both in Illinois.
1,348,412 Syringe nozzle tip. G. V. Harriman, New York City.
1,348,466 Tire-patch. W. C. Wood, Minneapolis, Minn.
1,348,516 Inflatable hand cushion for plasterers' hawks. E. J. Peck, Portland, Ore.
1,348,522 Spring-tire. M. O. Sweiven, Olivia, Minn.
1,348,614 Resilient tire. L. W. Wood, Fontanelle, Iowa.
1,348,706 Flexible and resilient shoe sole with intermediate layer of rubber. J. B. Frechette, Valparaiso, Ind.
1,348,728 Pessary. L. Martocci-Pisculli, New York City.
1,348,754 Elastic dress-shield supporter. E. Schrader, Salina, Kansas.
1,348,796 Syringe. C. E. A. Gronbech, New York City, assignor to Charles J. Tagliabue Manufacturing Co., Brooklyn—both in New York.
1,348,818 One-piece waterproof garment. D. L. MacCallum, Cambridge, Mass.
1,348,819 Gas mask. E. W. Miller, Washington, D. C.

ISSUED AUGUST 10, 1920

1,348,950 Aviator's helmet with similarly shaped outer container for water or air. A. Kaminski, Uniontown, Pa.
1,348,954 Cushion tire. C. D. Macropoulos, New York City.
1,348,971 Toy airplane operated by rubber band. A. F. Thurnau, assignor to Lawrence Airplane Model & Supply Co.—both of Chicago, Ill.
1,348,975 Vehicle-wheel with demountable rim. L. V. Annable, assignor, by mesne assignments, to The Standard Parts Co.—both of Cleveland, Ohio.
1,349,055 Tire tread. W. N. Forbes, Dartmouth, Nova Scotia, Canada.
1,349,124 Tire carcass. G. F. Fisher, Plainfield, N. J., assignor to Revere Rubber Co.
1,349,163 Resilient cushion tire. C. LaCour, Dixon, Ill.
1,349,206 Bathing cap. O. R. Jeffers, assignor to General Patent Manufacturing Co.—both of Chicago, Ill.
1,349,263 Gum and mint case. L. W. Buchenau, Stockton, Calif.
1,349,295 Metal-studded fabric band antiskid for tires. W. Reinl, Secaucus, N. J.
1,349,296 Rubber footwear and method of manufacture. J. M. Rice, F. A. Joseph, and A. D. Rupp—all of New Haven, Conn.
1,349,335 Balloon valve. J. R. Gammeter, Akron, Ohio, assignor to The B. F. Goodrich Co., New York City. (See THE INDIA RUBBER WORLD, August 1, 1919, page 637.)
1,349,339 Spring wheel. H. M. Horne, assignor of one-half to W. J. Sudderth—both of Sulphur Springs, Tex.
1,349,366 Tire abrader, F. J. Cordell, St. Louis, Mo. (See THE INDIA RUBBER WORLD, February 1, 1920, page 297.)
1,348,441 Milking machine with rubber teat-cup linings. W. A. Shippert, Chicago, Ill.
1,349,463 Dust cap for pneumatic tire valves. J. W. Laird, Pasadena, Calif.
1,349,474 Syringe. O. O. R. Schwidetzky, Hasbrouck Heights, assignor to Beckton, Dickinson & Co., Rutherford—both in New Jersey.
1,349,513 Parachute. Z. Koza, Akron, Ohio.
1,349,517 Fountain brush. J. Lukaszewski, Chicago, Ill.

ISSUED AUGUST 17, 1920

1,349,572 High rubber boot with laced foot portion. C. W. Hubbell, assignor to The Goodyear's India Rubber Glove Manufacturing Co.—both of Naugatuck, Conn.
1,349,593 Apparatus for mooring dirigibles and the like. E. S. Ullmann, New York City.
1,349,744 Rubber-soled canvas shoe. H. Westling, assignor to Apsley Rubber Co.—both of Hudson, Mass.
1,349,745 Rubber-soled shoe. H. Westling, assignor to Apsley Rubber Co.—both of Hudson, Mass.
1,349,767 Rubber-dam clamp forceps. J. W. Ivory, Philadelphia, Pa.
1,349,779 Recoil pad for firearms. W. L. Marble, Gladstone, Mich.
1,349,902 Tire bead. T. Midgley, Springfield, assignor to The Fisk Rubber Co., Chicopee Falls—both in Massachusetts.
1,349,922 Tire valve cap. R. H. Simpson, Berkeley, Calif.
1,350,016 Low-pressure signal for subnormal tires. C. T. Ewing and A. Ewing—both of Los Angeles, Calif.
1,350,083 Car hose-coupling. E. A. Schreiber, assignor to Vapor Car Heating Company, Inc.—both of Chicago, Ill.
1,350,190 Non-slip heel for footwear. G. W. Watson, Boston, Mass.
1,350,192 Dress shield. H. Weeks, assignor of one-half to S. E. Durant—both of New York City.
1,350,205 Hose reel. J. E. Anderson, Jamestown, N. D.
1,350,211 Sea dirigible. D. Corson, Jr., Mount Union, Pa.
1,350,216 Shoe heel with rubber plug. G. F. Fischer, Rochester, N. Y.

*Omitted from our issue of June 1, 1920.

THE DOMINION OF CANADA

ISSUED JULY 27, 1920

202,146 Tire casing. H. E. Grabau and A. C. Schwartz, coinventors, both of New York City, U. S. A.
202,222 Overshoe retainer. V. E. Langhardt, Fresno, Calif., U. S. A.
202,251 Demountable rim for tires. S. M. Saltzman, Brooklyn, N. Y., U. S. A.
202,288 Tire casing. The Canadian Consolidated Rubber Co., Limited, Montreal, Quebec, Canada, assignee of DeC. Neal, Charlotte, N. C., U. S. A.
202,303 Rubber heel with attaching device. The Hill Rubber Heel Co., assignee of R. I. Hill—both of Elyria, Ohio, U. S. A.
202,325 Rubber glove with constricted finger portions to take up slack. The Sterling Rubber Co., assignee of J. B. Abler—both of Guelph, Ont.
202,339 Composition cord fabric and rubber sole for boots and shoes. J. E. Grosjean, assignor, and F. L. Maire, assignee of a half-interest—both of Lima, Ohio, U. S. A. (See THE INDIA RUBBER WORLD, June 1, 1920, page 590.)

ISSUED AUGUST 3, 1920

202,363 Sanitary mattress cover pad with rubber insert. J. W. and M. E. Callahan, coinventors—both of El Paso, Texas, U. S. A.
202,368 Breast pump. A. E. Anderson, Saskatoon, Saskatchewan.
202,438 Adjustable skirt with elastic belt. T. La Maida, New York City, U. S. A.
202,439 Celluloid fountain pen with rubber washer. F. La Bocuf, Belleville, N. J., U. S. A.
202,447 Pneumatic tire. C. L. Marshall, London, E. C. 4, England.
202,482 Spring wheel with cushion tire. T. Rozankovich, Galveston, Texas, U. S. A.
202,483 Wheel cushion and means for mounting same. A. L. Runyan, Omaha, Nebraska, U. S. A.
202,510 Tire carrying rim for automobile wheels. J. H. Wagenhorst, Jackson, Michigan, U. S. A.
202,511 Tire carrying rim for automobile wheels. J. H. Wagenhorst, Jackson, Michigan, U. S. A.
202,526 Fountain pen. The Autopoint Pencil Co., assignor of C. R. Keeran, both of Chicago, Illinois, U. S. A.
202,539 Radio operator's helmet. The International Western Electric Co., Inc., New York City, U. S. A., assignee of The Western Electric Company, Montreal, Que., assignee of F. D. Waldron, Brooklyn, N. Y., U. S. A.
202,551 Apparatus for transmitting selected sounds and excluding others, for use of aviators. The Stentor Electric Manufacturing Co., Inc., assignee of J. L. Spence—both of Long Island City, N. Y., U. S. A.
202,568. Bottle closure or cover with two openings and inside gasket. F. Deighton and E. Islip, assignee of a half interest—both of Toronto, Ont.

ISSUED AUGUST 10, 1920

202,659 Reinforced resilient tire. J. H. Douglas, Norfield, Mississippi, U. S. A.
202,688 Undergarment having an outside elastic band adjacent to the waist portion. K. Heitler, New York City, U. S. A.
202,698 Life preserver. S. Kelso, Toronto, Ont.
202,703 Reinforced tire. F. W. Kremer, New York City, U. S. A.
202,742 Resilient tire filler. A. L. Runyan, Omaha, Neb., U. S. A.
202,753 Hose coupling. W. E. Smith, Gainesville, Ga., U. S. A.
202,833 Demountable split tire rim. A. O. Vanzandt and A. J. Sperber, each an assignee of a half interest—both of Toledo, O., U. S. A.

ISSUED AUGUST 17, 1920

202,903 Rubber tobacco pouch. L. T. Adelman, LaKemp, Okla., U. S. A.
202,912 Cushion tire. M. E. Baxter, East Liverpool, O., U. S. A.
202,918 Child's comforter with sponge rubber inside rubber teat. R. Briggs, St. Kilda, Victoria, Australia.
202,951 Pneumatic tire with armor having pieces of vulcanite reinforced with metal plates embedded in its layers. J. E. Dysart, Cadiz, O., U. S. A.
203,003 Pneumatic tire. C. L. Marshall, London, E. C. 4, England.
203,048 Garment supporter. M. Starmer, Newport News, Va., U. S. A.
203,060 Inner tube having bead with countersink for valve. H. B. Wallace, St. Louis, Mo., U. S. A.
203,075 Submarine sound-detecting device having unstretched and unstrained soft rubber diaphragm. The Canadian General Electric Co., Limited, Toronto, Ont., assignee of W. D. Coolidge, Schenectady, N. Y., U. S. A.
203,076 Submarine sound-receiving device with an enclosed chamber for microphone having at least one wall of soft rubber. The Canadian General Electric Co., Limited, Toronto, Ontario, Canada, assignee of C. W. Rice, Schenectady, N. Y., U. S. A.
203,077 Submarine sound-detecting device with rubber diaphragm and microphone attached. The Canadian General Electric Co., Limited, Toronto, Ont., assignee of I. Langmuir, Schenectady, N. Y., U. S. A.
203,104 Kite balloon with ballonet separate from envelope with automatic inlet and outlet valves. The Goodyear Tire & Rubber Co., assignee of R. Upson—both of Akron, O., U. S. A.
203,118 Tire pressure gage. A. Schrader's Son, Inc., New York City, assignee of H. Keyton, North Bergen, N. J.—both in U. S. A.
203,119 Tire pressure gage. A. Schrader's Son, Inc., New York City, assignee of J. A. Bowden, Los Angeles, Calif.—both in U. S. A.

Chemical Patents will be found on pages 29, 30. Machinery Patents on pages 33, 34.

203,127 Dirigible mooring device. Vickers, Ltd., Westminster, London, assignee of Sir. J. McKechnie, K. B. E., of Barrow-in-Furness, and B. N. Wallis, of Grange-over-Sands, both of Lancaster—all in England.

THE UNITED KINGDOM

ISSUED AUGUST 5, 1920

143,959 Pneumatic tire reinforced by overlapping metal plates between casing and tube. J. E. Wilkes, 24 Horseley road, Tipton, Staffordshire.

143,966 Games employing rubber bulbs. J. L. Palmer and H. M. Smith—both of 16 Great George street, Westminster.

144,033 Tire valve. T. A. Low, Renfrew, Ontario, Canada.

144,042 Safety feet for ladders. J. Paterson, Laurel Bank, Burneside, near Kendal, Westminster.

144,043 Safety inner pocket closed by a broad band of elastic. G. Dickson, 21 Cedar street, Cheetham, Manchester.

144,046 Parachute. A. Merchant, Bobbin Works, Forres, Morayshire.

144,053 Rubber-lined tobacco pouch. R. Lyons, 60 City Road, Manchester.

144,133 Tank for coagulating rubber. T. Burney, Holland House, Bury street, London.

144,178 Detachable rubber heels. W. J. Sellars, 213 Tinakori road, Wellington, New Zealand.

144,188 Boot protectors consisting of three rubber pads of special shape. T. W. Green, 179 Forest road, Walthamstow, London.

144,219 Suction denture. A. L. Davis, 2 Devonshire street, Chesterfield, Derbyshire.

144,222 Pocket respirator. C. Rosling and R. H. Davis—both of 187 Westminster Bridge road, London.

144,224 Artificial legs with rubber cords. P. A. Ingold, 8 Jchannvorstatt, Bâle, Switzerland.

144,237 Moustache trainer with rubber band. L. Doubnikoff, 65 Hallam street, London.

144,241 Resilient wheel with intermediate pneumatic chamber. A. A. A. Darche, Edith Cavell road, Alger, Algeria. (Not yet accepted.)

144,262 Fabric-covered metallic patch for repairing tires. E. M. Steel, Washington, U. S. A. (Not yet accepted.)

144,275 Reinforced pneumatic tire. P. A. Sawyer, 78 North Main street, and W. C. Burton—both in Memphis, Tennessee. (Not yet accepted.)

144,279 Rubberized tobacco pouches. I. B. Kleinert Rubber Co., assignee of V. Guinsburg—both of 725 Broadway, New York City, U. S. A. (Not yet accepted.)

144,312 Pneumatic supports. H. Seibel, 572 Folsom street, San Francisco, California, U. S. A. (Not yet accepted.)

144,345 Sound detecting and locating apparatus for hydrophones, aerophones, etc., of which the complete receiver may be fitted within a rubber sphere. D. N. Browning, 4 Clayton terrace, Dennistoun, Glasgow, Scotland.

ISSUED AUGUST 11, 1920

144,435 Deformable blocks of rubber, etc., used in spring wheels, couplings and vibration-dampers. C. Reuse, 18 Quai au Charbon, Halle, Belgium.

144,454 Stoppers for hot-water bottles, etc. Ioco Proofing Co., Netherton Works, Anniesland, Glasgow, and H. D. Watt, Drumchapel, Dumbartonshire.

144,554 Device for securing heelpads. E. M. Hamilton, 10 Chester Crescent, Newcastle-on-Tyne.

144,646 Resilient tire. F. W. Kremer, 116 West 39th street, New York City, U. S. A. (Not yet accepted.)

144,683 Tire valves. Payne Valve Corporation, assignee of M. J. Payne—both of Witz Building, Staunton, Virginia, U. S. A. (Not yet accepted.)

144,696 Pneumatic tire. H. L. Ochs, 1520 Grand avenue, Kansas, Missouri, U. S. A. (Not yet accepted.)

ISSUED AUGUST 18, 1920

144,799 Submarine sound filters or resonators. J. A. Burgess, Grand place, Washington, and G. B. Hutchings, Box 10, Richmond, Virginia—both in U. S. A.

144,848 Dust caps for tire valves. D. H. Webster, New York City, U. S. A.

144,892 Spring tire with rim enclosing air tube. G. Negri, 31 via XX Septembre, Genoa, Italy.

144,941 Knee pads containing insert of rubber, gutta percha, etc., to provide warmth. R. Walsh, 5 Clifford street, Nelson, Lancashire.

144,954 Reinforced tire filler with inflatable and non-inflatable chambers. R. Blakoe, 46 Bryanston street, Marble Arch, London.

144,986 Rubber sole with upstanding rubber pads secured to boot by adjustable pieces of leather. B. A. Thornhill, Single Tree, Newera Eliya, Ceylon.

145,091 Pneumatic milking-machine. De Laval Separator Co., 165 Broadway, New York City, assignee of M. Leitch, Kingwood Park, Poughkeepsie, N. Y.—both in U. S. A. (Not yet accepted.)

ISSUED AUGUST 25, 1920

145,127 Land wheels with rubber springs for deadening shock of landing in a seaplane. Fairey Aviation Co. and C. R. Fairey—both of Clayton road, Hayes, Middlesex.

145,155 Repair vulcanizer. W. Frost and H. Frost & Co.—both of 148 Great Portland street, London.

145,175 Demountable rim for tires. C. F. Rubsam, 233 Broadway, New York City, U. S. A.

145,254 Apparatus for reclaiming rubber, etc., from waste. E. C. Marks, 57 Lincoln's Inn Fields, London. (Acushnet Process Co., 52 Vanderbilt avenue, New York City, U. S. A.)

145,269 Automatic valve for kite balloons. J. D. Mackworth, 17 Devonshire street, Portland Place, London, and A. P. Starkey, Dunsmore, South Hill avenue, Harrow.

145,296 Mine breathing-appliances. G. L. Brown, 159 Yorke street, Mansfield Woodhouse, Nottinghamshire.

145,298 Return balls of cork with elastic cord. H. C. Wood, 5 Bromfield terrace, Tadcaster, Yorkshire.

145,312 Wheel tires. C. L. Marshall, 27 Queen Victoria street, London.

145,333 Combined cushion and pneumatic tire. R. Blakoe, 46 Bryanston street, Marble Arch, London.

145,341 Pneumatic tire having rubber security-band to seat on rim. F. L. Rapson, Childwall Hall, London.

145,455 Portable respiratory apparatus. A. B. Drager, trading as Dragerwerk H. & B. Drager, Finkenberg, Lubeck, Germany. (Not yet accepted.)

TRADE MARKS

THE UNITED STATES

NO. 110,636. Representation of a section of hose—rubber or rubber composition hose. Voorhees Manufacturing Co., Jersey City, N. J.

115,293. The words SNAP LOX—dust caps for pneumatic tire valves. (See THE INDIA RUBBER WORLD, April 1, 1920, page 434.) Newson Valve Co., St. Louis, Mo.

120,516. The word BARCO—composition asbestos and rubber gaskets, etc., Barco Manufacturing Co., Chicago, Ill.

122,220. The words MCRAE'S MADE RIGHT worked into representation of a stencil, the initials M and R serving for both sets of words—inner tubes. McRae Wholesale Hardware Co., Helena, Ark.

123,740. Conventionalized representation of a bird with outspread wings standing on a tire across which is superimposed the word JENCKES, having large letters at both ends—tire fabrics in the piece. Jenckes Spinning Co., Pawtucket, R. I.

124,696. Representation of label bearing picture of a courtier and the words DULUTH STANDARD—armbands, garters and suspenders. Slonim Brothers, Duluth, Minn.

125,774. The words NE-PAC—rubber and balata belting and packing, pneumatic and solid rubber tires, rubber and fabric gaskets, rubber composition and fabric valves, and model-rubber ammonia rings. Capen Belting & Rubber Co., St. Louis, Mo.

127,453. Representation of an inner tube and the word KANTKUMOFF in white against a rectangular background—rubber patches for repairing rubber or fabric articles. Stearns Rubber Products Co., Chicago, Ill.

127,968. The word GASMASK—rubber sheeting in the piece or roll. H. L. Kaufmann, Louisville, Ky.

128,862. Representation of an eagle carrying arrows in his talons and in his beak a scroll bearing the word RUBBERWELD—cement for patching rubber, leather and fabric articles. Albert J. Tomlinson, Wichita, Kansas.

129,103. The word HEATHERSTONE—fabric and rubber carriage cloth. United States Rubber Co., New Brunswick, N. J., and New York City.

129,104. The word VENTEEL—fabric and rubber carriage cloth. United States Rubber Co., New Brunswick, N. J., and New York City.

129,105. The word YARNTEX—fabric and rubber carriage cloth. United States Rubber Co., New Brunswick, N. J., and New York City.

129,108. The word MILLHYDE—fabric and rubber carriage cloth. United States Rubber Co., New Brunswick, N. J., and New York City.

129,277. Representation of a tire encircling map of the State of Ohio and bearing the words THE OHIO STATE RUBBER TIRE CO., PORT CLINTON, OHIO—pneumatic tires and inner tubes. The Ohio State Rubber Tire Co., Port Clinton, Ohio.

129,910. The word NAUGATOP—fabric and rubber carriage cloth. United States Rubber Co., New Brunswick, N. J., and New York City.

129,911. The word RAYNBAR—fabric and rubber carriage cloth. United States Rubber Co., New Brunswick, N. J., and New York City.

129,913. The word SUPERTEX—fabric and rubber carriage cloth. United States Rubber Co., New Brunswick, N. J., and New York City.

130,289. The word PRUDENTIAL—tires and tubes. The Prudential Rubber Co., Akron, Ohio.

130,323. The words RED RAVEN RUBBER COMPANY within a shaded oval—tires and tubes. J. H. Dwork, Newark, N. J.

130,470. The word PICHER within a conventional line border—storage batteries and parts. The Eagle-Picher Lead Co., Cincinnati, Ohio.

130,520. The word "MACGREGOR" quoted—golf balls, etc. The Crawford, Macgregor & Canby Co., Dayton, Ohio.

130,527. The words GOLD SEAL—rubber tires and inner tubes. Dryden Rubber Co., Chicago, Ill.

130,755. The word SOXLOX—hose supporters. C. W. Egerton, 191 Halsey street, Brooklyn, N. Y.

130,878. The word ATLANTIC—rubber tires. The Charles William Stores, Inc., Brooklyn, N. Y.

131,179. Conventionalized representation of a tire surrounding a bust portrait of Lincoln and bearing the words HONEST ABE—rubber tires, casings and tubes. Lincoln Tire & Rubber Co., Youngstown, Toledo, Piqua and Troy, Ohio, and Miami, Florida.

131,372. Representation of a bulldog—dental rubber, dam and bulbs. Atlantic Rubber Manufacturing Corporation, New York City.

131,393. The word LEATHEREIGN—men's, women's and children's raincoats, etc. C. Kenyon Co., Brooklyn, N. Y.

131,487. Representation of a label bearing a silhouette of fir trees and the words COUNTRI MUFTI—men's and women's raincoats and rubber gloves. John Lurie, Inc., New York City.

131,570. The words PONY BLIMP separated by a representation of a winged horse—motor-driven balloons. The Goodyear Tire & Rubber Co., Akron, Ohio.

131,714. The word PROTECTO—sanitary bloomers. Rubberized Sheeting & Specialty Co., Inc., New York City.

131,737. The word LEATHEREIGN—waterproof fabrics in the piece. C. Kenyon Co., Brooklyn, N. Y.

131,743. The words TEDDY PANTS—rubber baby-pants and diaper covers. The Miller Rubber Co., Akron, Ohio.

131,791. The words PONY BLIMP—motor-driven balloons. The Goodyear Tire & Rubber Co., Akron, Ohio.

131,949. The word EDISON—fountain pens and pen points. Edison Pen Co., Inc., Petersburg, Va.

132,086. The words POWER PLUS with the loop of the initial P containing the remainder of the word Power in staggered letters, and below the loop the word Plus, also in staggered letters—repair patches for tires and tubes. Darling, Miller & Co., New York City.

132,278. The word HUSKIE—rubber vehicle tire casings and tubes. The United Rubber Company, Akron, Ohio.

132,293. Conventional representation of two thistle blossoms on a stem between two leaves, above the words STEAM CURED—dress shields. J. J. Beyerle Manufacturing Co., New York City.

132,294. The word IRENE—dress shields. J. J. Beyerle, New York City.

132,347. The word EXCELLO—rubberized mackinaws, mackintoshes, etc. Excello Clothing Company, Inc., Passaic, N. J.

132,597. The facsimile autographic signature DOROTHY DODD—men's, women's and children's boots, shoes and slippers of leather, rubber and fabric. Dorothy Dodd Shoe Co., Boston, Mass.

132,610. The words QUEEN QUALITY—men's, women's and children's boots, shoes and slippers of leather, rubber and fabric. Thomas G. Plant Co., Boston, Mass.

133,339. The letter H within two concentric circles—tires and tubes. The United Rubber Co., Akron, Ohio.

133,611. The word DIT vertically placed within conventional arrangement of lines—rubber boots. George F. Dittmann Boot & Shoe Co., St. Louis, Mo.

134,005. Representation of a seal bearing figure of an eagle perched on several rolls of belting, beneath the words ORIGINAL MANUFACTURERS OF MECHANICAL RUBBER GOODS, ESTABLISHED 1828, all within a border bearing the words BOSTON BELTING COMPANY, BOSTON, MASS.—roller covers. Boston Belting Co., Boston, Mass.

134,116. Representation of a caravel beside the word CARAVEL—rubber elastic for garters and bands, notions, etc. Caravel Company, Inc., New York City.

134,498. Conventionalized star design within a circle, with the letter W in the center of the star—silk elastic garter-web, silk cable elastic web, lisle elastic, silk elastic, etc. George Williams Co., New York City.

134,992. The letter A within a spade spot outline—hard rubber knife and razor handles and hard rubber pumps. American Hard Rubber Co., Hempstead and New York, N. Y.

THE DOMINION OF CANADA

26,833. The words C. S. F. SHOE FINDINGS AND NOVELTIES—rubber heels, foot appliances, etc. Canadian Shoe Findings Novelty Co., Toronto, Ont.

26,836. The word VALVENE—washers for water taps. The Commercial India Rubber Manufacturing & Supply Co., Limited, 585 Commercial Road, London, Eng.

26,842. The words NATTY PAD in fancy type with flourishes—garters. George Frost Co., Boston, Mass., U. S. A.

26,853. The word TIROMETER—combined tire and tube valve and gage. Tirometer Valve Corporation of America, Charleston, W. Va., U. S. A. (See THE INDIA RUBBER WORLD, April 1, 1920, page 434.)

26,868. The word PREMIER—erasers, etc. Twigg & Beeson, 6-7 Ludgate Hill, Birmingham, England.

26,879. The word FIRESTONE—pneumatic and solid tires. Firestone Tire & Rubber Co., Akron, O., U. S. A.

26,882. The words TWIN and WEDGE within a heel-shaped outline—rubber heels for men's, women's and children's shoes. Barva Heel & Tire Factory, Inc., Fort Wayne, Ind., U. S. A.

26,942. The word SORBO—rubber sponges and other sponge rubber products, etc. Sorbo Rubber-Sponge Products, Limited, Sorbo Works, Maybury Road, Woking, Surrey, Eng.

AUSTRALIA

TO AMERICANS

26,867. Representation of head of an Indian within a tire upon which are inscribed the words THE SAVAGE TIRE COMPANY—tires. The Savage Tire Co., San Diego, Calif., U. S. A.

26,689. The word Usco—hose and packing. United States Rubber Co., New York City, U. S. A.

DESIGNS

THE UNITED STATES

NO. 55,947. Highway advertising and directing device formed by a representation of a tire through which an arrow passes from left to right. Patented August 3, 1920. Term 7 years. F. A. Horn, Denver, Col.

55,966. Tire tread. Patented August 3, 1920. Term 7 years. J. D. Tew, Akron, Ohio, assignor to The B. F. Goodrich Co., New York City.

55,975. Air-pump nozzle. Patented August 10, 1920. Term 7 years. C. M. Boyce, Westcliff-on-Sea, England.

55,987. Non-skid tire. Patented August 10, 1920. Term 14 years. W. E. Duersten, New Castle, Pa.

56,000. Rubber heel. Patented August 10, 1920. Term 14 years. S. B. Frederick, Detroit, Mich.

56,046. Tire. Patented August 10, 1920. Term 14 years. W. W. Wildman, assignor to The Wildman Rubber Co.,—both of Detroit, Mich.

55,966 55,987 56,046 56,103 56,104 56,105

56,067. Two-faced double-sided doll. Patented August 10, 1920. Term 14 years. F. Kaupmann, Jr., Brooklyn, N. Y., assignor to The Faultless Rubber Co., Ashland, Ohio.

56,071. Tire cover. Patented August 10, 1920. Term 7 years. P. M. Lockwood, Kansas City, Mo.

56,073. Advertising and toy balloon in shape of a tire with balloon basket suspended below. Patented August 10, 1920. Term 14 years. W. M. Madison, Cleveland, Ohio.

56,103. Tire. Patented August 17, 1920. Term 14 years. A. J. Pennington, assignor to U. S. Compression Inner Tube C.o,—both of Tulsa, Okla.

56,104. Tire. Patented August 17, 1920. Term 14 years. A. J. Pennington, assignor to U. S. Compression Inner Tube Co.—both of Tulsa, Okla.

56,105. Tire. Patented August 17, 1920. Term 14 years. A. J. Pennington, assignor to U. S. Compression Inner Tube Co.—both of Tulsa, Okla.

THE DOMINION OF CANADA

4,836. Badge, consisting of a representation of an automobile wheel with tire and three big letters: A. O. A., the letter O in the center of the wheel and an A on each side; also the words Automobile Owners' Association on the tire. Patented August 3, 1920. Automobile Owners' Association, Montreal, Que.

GERMANY

DESIGN PATENTS ISSUED, WITH DATE OF ISSUE

747,957 (July 15, 1920) Suspender made of a strip of rubber. Georg Stange, Koethener Strasse 49, Leipzig-Gohlis.

748,036 (July 15, 1920) Medical syringe. Robert E. Klett, Ridgefield Park.

748,150 (July 19, 1920) Toy made of soft rubber. Michael Hahn, Neuhauser Strasse 12, Muenchen.

748,373 (June 15, 1920) Elastic heel insert. Heinrich Dresing, Lutgendortmund.

748,375 (June 21, 1920) Exchangeable rubber heel. Gustav Milse, Bremen.

EXPORTS OF INDIA RUBBER AND CAUCHO FROM MANAOS DURING JULY, 1920

Exporters	EUROPE Fine.	Medium.	Coarse.	Caucho.	Totals.	NEW YORK Fine.	Medium.	Coarse.	Caucho.	Totals.	Grand Totals.
Stowell & Co.....kilos	83,153	3,216	23,136	145,127	254,632	2,104	4,750	24,700	.....	31,554	286,186
General Rubber Co. of Brazil.....	141,818	20,064	6,078	40	168,000	8,160	10,030	6,114	43,096	67,400	235,400
Tancredo, Porto & Co.....	43,130	7,763	2,893	891	54,677	4,104	1,214	42	29	5,389	60,066
Higson & Fall.....	.....	.....	683	100	783	2,118	245	2,153	.....	4,516	5,299
	268,101	31,043	32,790	146,158	478,092	16,486	16,239	33,009	43,125	108,859	586,951
In transit from Iquitos.....	.....	.....	.....	198	198	4,895	23,418	2,529	11,075	41,917	42,115
Totals .....kilos	268,101	31,043	32,790	146,356	478,290	21,381	39,657	35,538	54,200	150,776	629,066

Compiled by Stowell & Co., Manáos, Brazil.

EXPORTS OF INDIA RUBBER FROM PARA, MANAOS AND IQUITOS DURING THE MONTH OF JULY, 1920

Exporters	EUROPE Fine.	Medium.	Coarse.	Caucho.	Totals	NEW YORK Fine.	Medium.	Coarse.	Caucho.	Totals.	Grand Totals.
J. Marques .....kilos	86,852	600	466	.....	87,918	14,589	10,103	37,243	36,450	98,376	186,294
Stowell & Co.....	45,794	5,350	7,854	3,246	62,244	.....	.....	.....	51,300	51,300	113,544
Bitar Irmãos	31,581	1,530	1,066	63,781	97,958	.....	.....	.....	5,100	5,100	103,058
Ferreira, Costa & Co.....	.....	.....	.....	.....	.....	.....	.....	24,420	60,000	84,420	84,420
Berringer & Co.....	5,270	1,700	360	700	8,030	10,977	.....	27,666	30,711	69,354	77,384
General Rubber Co.....	.....	.....	.....	.....	.....	29,815	1,462	1,724	39,275	72,277	72,277
Suarez, Filho & Co.....	23,970	.....	5,197	.....	29,167	.....	.....	.....	.....	.....	29,167
Alfredo Valle & Co.....	.....	.....	.....	.....	.....	.....	.....	.....	15,750	15,750	15,750
Sundries	55,203	5,759	3,358	1,348	65,668	.....	.....	.....	.....	.....	65,668
	248,670	14,939	18,301	69,075	350,985	55,373	11,565	91,053	238,586	396,577	747,562
From Manáos	455,582	62,171	38,339	108,624	664,716	4,902	12,815	19,053	26,900	63,670	728,386
From Iquitos	.....	.....	.....	198	198	28,130	183	2,529	11,075	41,917	42,115
Totals	704,252	77,110	56,640	177,897	1,015,899	88,405	24,563	112,635	276,561	502,164	1,518,063

Compiled by Stowell & Co., Pará, Brazil.

Review of the Crude Rubber Market

NEW YORK.

SEPTEMBER witnessed the lowest prices on standard plantation rubber ever recorded in the New York market. Spot first latex crêpe sold for 24½ cents, smoked sheet ribbed 23½ cents and upriver fine 27 cents. Futures likewise made low records of 30 cents for January-June, first latex crêpe, and 28 cents for ribbed smoked sheet.

With practically no demand from the large manufacturers, the only market sustaining features were small factory replacements and the limited business of dealers covering short sales. As the month progressed the market became weak, and, lacking the support of the dealers, who had withdrawn, fearing greater losses, values continued to fall. That the bottom of the market has been reached is believed in many quarters, however, until the banks resume credits, the production of rubber goods returns to normal, and buying is again resumed by the manufacturers, uncertainty will cloud the crude rubber situation.

Arrivals of crude rubber during August were 13,564 tons, compared with 11,067 tons a year ago. Total arrivals for eight months ended August 31, 1920 were 181,337 tons, compared with 142,759 for the same period in 1919. It is estimated that 26,000 tons are in store in New York at the present time, including a large amount of mouldy rubber that is being sold at 21½ to 23 cents, according to quality.

Spot and future quotations on standard plantation and Brazilian sorts at the first and last of the past month were as follows:

PLANTATIONS. September 4, first latex crêpe, 29 cents; October-December, 30½ cents; January-June, 35½ cents.

September 27, first latex crêpe, 25½ to 26 cents; October-December, 26½ to 27½ cents; January-June, 30 to 31 cents.

September 4, ribbed smoked sheets, 27 cents; October-December, 29½ cents; January-June, 34½ cents.

September 27, ribbed smoked sheets, 23¾ to 24½ cents; October-December, 25 cents; January-June, 28 to 30 cents.

September 4, No. 1 amber crêpe, 29 cents.

September 27, No. 1 amber crêpe 21 to 23 cents.

September 4, No. 1 rolled brown crêpe, 25 cents.

September 27, No. 1 rolled brown crêpe, 17½ to 18 cents.

SOUTH AMERICAN PARÁS AND CAUCHO. September 4, upriver, fine, 28½ cents; islands fine, 28 cents; upriver coarse, 21 cents; islands coarse, 19 cents; Cametá coarse, 17 cents; caucho ball, 21 cents.

September 27, upriver fine, 25 to 26 cents; islands fine, 25 to 26 cents; upriver coarse, 16½ to 17 cents; islands coarse, 15 cents; Cametá coarse, 15 to 15½ cents; caucho ball, 14 to 19 cents.

NEW YORK QUOTATIONS

Following are the New York spot quotations, for one year ago, one month ago, and September 27, the current date:

	October 1, 1919	September 1, 1920	September 27, 1920
PLANTATION HEVEA—			
First latex crêpe	$0.49½@	$0.31 @	$0.25 @$0.26
Amber crêpe No. 1	.46½@	.29 @	.21 @.23
Amber crêpe No. 2	.45½@	.28 @	.22 @
Amber crêpe No. 3	.44½@	.27 @	.21 @
Amber crêpe No. 4	.43½@	.26 @	.20 @
Brown crêpe, thick and thin	.44½@	.26 @	.19 @.23
Brown crêpe, specky	.42½@	.25 @	.20 @
Brown crêpe, rolled	.37 @	.24½@	.17½@.18
Smoked sheet, ribbed, standard quality	.48½@	.30 @.30½	.23¾@.24½
Smoked sheet, plain standard quality	.45 @	.29 @	.22 @
Unsmoked sheet, standard quality	.42 @	.26 @	.19 @
Colombo scrap No. 1	.38 @	.22 @	.15 @
Colombo scrap No. 2	.36 @	.21½@	.14 @
EAST INDIAN—			
Assam crêpe	@	@	@
Assam onions	@	@	@
Penang black scrap	@	@	@
PONTIANAK—			
Banjermassin	.12 @	.09¼@.11½	.10 @.11
Palembang	@	.10¼@	.10½@.13
Pressed block	.24 @	.19 @	.18 @.21
Sarawak	@	.08¾@	.09 @
SOUTH AMERICAN—			
PARAS—			
Upriver fine	.54½@	.31 @.30	.25 @.26
Upriver medium	.52 @	.29 @.30	.23 @.24
Upriver coarse	.33 @	.21½@.22	.16½@.18
Upriver weak, fine	.41 @	.27 @	.21 @.22
Islands, fine	.47½@	.28 @	.25 @.26
Islands, medium	.45 @	*.26 @.28	.23 @
Islands, coarse	.22 @	.19 @	.15 @
Cametá, coarse	.22½@	.17 @	.15 @.15½
Madeira, fine	.56 @	.35 @	.29 @
Acre Bolivian, fine	.55 @.55½	.33½@.34	.28 @
Peruvian, fine	.52 @	.31 @	.26 @
Tapajos, fine	.53 @	.30 @.31	.23 @
CAUCHO—			
Upper caucho ball	.33 @	.21½@.22	.19 @
Lower caucho ball	.31½@	.18½@	.14 @
MANICOBAS—			
Ceará negro heads	.38 @	.23 @	*.14 @
Ceará scrap	.28 @	.20 @	*.12 @
Manicoba, 30% guarantee	.35 @	.25 @	*.15 @
Mangabeira thin sheet	.38 @	.28 @	*.18 @
CENTRALS—			
Corinto scrap	.33 @	.18 @	.17 @.18
Esmeralda sausage	.32 @	.18 @	.17 @.18
Central scrap	.32 @	.18 @	.17 @.18
Central scrap and strip	.29 @.30	.15 @	.15 @.17
Central wet sheet	.23 @	.13 @	.13 @
Guayule, 20% guarantee	.24 @	.27 @	.25 @
Guayule, washed and dried	.35 @	.37 @	.35 @
AFRICANS—			
Niger flake, prime	@	@	.18¼@
Benguela, extra No. 1, 28%	@	@	.11 @.15
Benguela, No. 2, 32½%	.25½@	@	@
Conakry niggers	@	@	@
Congo prime, black upper	.39 @	@	@
Congo, prime, red upper	@	@	@
Kasai black	@	@	@
red	@	@	@
Massai sheets and strings	@	@	@
Rio Nunez ball	@	@	@
Rio Nunez sheets and strings	@	@	@
GUTTA PERCHA—			
Gutta Siak	.25 @	.20½@.22½	.19 @.20
Red Macassar	@	2.00 @2.95	3.50 @
BALATA—			
Block, Ciudad Bolivar	.76 @	.67 @.68	.63 @
Colombia	.56 @	.47 @	.48 @
Panama	.45 @	.40 @	.35 @
Surinam sheet	@	.75 @	.69 @
amber	@	.82 @	.84 @

*Nominal.

RECLAIMED RUBBER

Business in reclaimed rubber during September was of lesser volume than that for August. Owing to conditions in the automobile manufacturing industry resulting in a marked lessening of demand for tires and topping material the manufacturers of these goods have very generally asked reclaimers for deferred shipments on their contracts from two to four months. Practically no new business is being placed. Thus, reclaiming plants are operating at only fractional capacity. The long continued record low prices of crude rubber grades has affected the prices of reclaims generally, although it is stated as a matter of trade opinion that crude is not displacing reclaims in those goods for which the latter is specially suited.

The demand for red reclaim has entirely disappeared from the market.

NEW YORK QUOTATIONS

SEPTEMBER 27, 1920

Prices subject to change without notice

STANDARD RECLAIMS:

Floating	$0.22	@	$0.24
Friction	.25	@	.30
Mechanical	.11	@	.12
Shoe	.14¼	@	.15½
Tires, auto	.14½	@	.15
truck	.12½	@	.13½
White	.20	@	.21

THE MARKET FOR COMMERCIAL PAPER

In regard to the financial situation, Albert B. Beers, broker in crude rubber and commercial paper, No. 1 Liberty street, New York City, advises as follows:

"During September there has been only a light demand for commercial paper, and almost entirely from out-of-town banks, rates ruling at 8¼ to 8½ per cent for the best rubber names, and 8¼ to 9 per cent for those not so well known."

COMPARATIVE HIGH AND LOW NEW YORK SPOT RUBBER PRICES

	September								
	1920*			1919			1918		
PLANTATIONS—									
First latex crêpe	$0.30	@	$0.24½	$0.55½	@	$0.45½	$0.63	@	$0.60½
Smoked sheet ribbed	.28¼	@	.23½	.54	@	.44½	.62	@	.59½
PARAS—									
Upriver, fine	.30	@	.25	.55¼	@	.54½	.68	@	.68
Upriver, coarse	.21	@	.16½	.33	@	.32	.40	@	.40
Island, fine	.28	@	.24	.48	@	.47½	.59	@	.59
Islands, coarse	.19	@	.15	.22	@	.21½	.27	@	.27
Cametá	.17	@	.15	.22	@	.21½	.28	@	.28

*Figured to September 27.

ANTWERP RUBBER MARKET

GRISAR & CO., Antwerp, report [September 3, 1920]:

We can report no change in the tone of the market, which continues weak. America is not yet buying and stocks are gradually accumulating.

The market closed with prices slightly lower than the preceding week. Spot, September, 1*s.* 8½*d.*; October-December, 1*s.* 10*d.*; January-March, 1*s.* 11½*d.*; January-June, 2*s.* 0½*d.*; Pará, 1*s.* 9*d.*

Statistics for the week were as follows: Arrivals, 2,022 tons; sales, 508 tons; stock, 29,911 tons against 28,368 tons the year before.

Statistics for the close of August: London—imports, 8,112 tons; sales, 2,918 tons; stock, 30,548 tons against 28,368 tons in 1919. Stock on hand this day about 986 tons.

The quiet tendency of the futures market becomes more accentuated, with business limited. Transactions amounted to 50,000 kilos. Closing quotations, each month: September-November, 10.00 francs; December-May, 10.05 francs; June-August, 10.10 francs. Tendency, quiet.

AMSTERDAM RUBBER MARKET

JOOSTEN & JANSSEN, Amsterdam, report [September 3, 1920]:

The market again was quiet and inactive, with only small fluctuations, but a rather sharp decline at the end.

Business was only small in spot rubber, and the new arrivals are being reserved for the subscription sale of September 21st.

The turnover on the terminal market was fairly satisfactory, but finally demand was extremely poor, and *Hevea* crêpe per December could be offered down to f.1.12½, and January-March to f.1.15½ without finding buyers, while sheets bought at f.1.04 per October, and f.1.14 per January-March.

STRAITS SETTLEMENTS RUBBER EXPORTS

An official report from Singapore states that the export of rubber from Straits Settlements ports in the month of July amounted to 10,773 tons (transhipments, 2,355 tons), as compared with 11,663 tons in June and 7,818 tons in the corresponding month last year. The total export to the end of July was 90,208 tons, as against 90,543 tons in 1919 and 44,158 tons in 1918 for the corresponding period.

Appended are the comparative statistics:

	1918	1919	1920
January ..... *tons*	4,302	14,404	13,125
February	2,334	15,661	17,379
March	8,858	20,908	5,931
April	6,584	10,848	15,720
May	13,587	15,845	15,617
June	6,515	5,059	11,663
July	1,978	7,818	10,773
Totals	44,158	90,543	90,208

FEDERATED MALAY STATES RUBBER EXPORTS

An official report from Kuala Lumpur states that the exports of rubber from the Federated Malay States in the month of July amounted to 8,043 tons, as compared with 9,049 tons in June and 8,640 tons in the corresponding month of last year. The total exports for seven months amount to 63,518 tons, as against 59,357 tons last year and 46,263 tons in 1918.

Appended are the comparative statistics:

	1918	1919	1920
January ..... *tons*	7,588	7,163	11,119
February	6,820	10,809	9,781
March	7,709	10,679	9,524
April	7,428	7,664	8,375
May	5,851	7,308	7,627
June	5,161	7,094	9,049
July	5,706	8,640	8,043
Totals	46,263	59,357	63,518

SINGAPORE RUBBER MARKET

GUTHRIE & CO., LIMITED, Singapore, report [August 12, 1920]:

The weekly rubber auction held yesterday and to-day opened quietly, bidding being very slow, and, though demand improved as the sale went on, prices of the leading grades show a decline. At the commencement, ribbed smoked sheet sold up to 62½ cents, and later advanced to 63½ cents, at which price it closed 1 cent down on the week. Fine pale crêpe was a difficult market, buyers' and sellers' ideas being too far apart. The top price of 69½ cents for this grade was exceptional, and not more than half a dozen lots sold at or near this figure, the average price being 67 to 67½ cents. There was a steady demand for off-quality lots of sheet. Browns were weaker, and dark and barky crêpes showed a slight improvement.

The quantity catalogued was 866 tons, of which 507 tons were sold.

The following is the course of values:

	In Singapore per Pound [1]			Sterling Equivalent per pound in London		
Sheet, fine ribbed smoked	62c	@	63½c	1/ 7¾	@	1/ 8½
Sheet, good ribbed smoked	50	@	61½	1/ 4½	@	1/ 7¾
Crêpe, fine pale	67	@	69½	1/ 9⅝	@	1/10⅜
Crêpe, good pale	53	@	66¼	1/ 5¼	@	1/ 9½
Crêpe, fine brown	55½	@	58	1/ 6⅜	@	1/ 7¼
Crêpe, good brown	40	@	55	1/ 2	@	1/ 6¾
Crêpe, dark	34½	@	44½	1/ 0½	@	1/ 3⅜
Crêpe, bark	32	@	37½	—/11¾	@	1/ 1⅜

[1] Quoted in Straits Settlements currency; $1 = $0.567 United States currency.

PLANTATION RUBBER EXPORTS FROM JAVA

	June		Six Months Ended June 30	
	1919	1920	1919	1920
To Netherlands ..... *kilos*	57,000	366,000	179,000	2,212,000
Great Britain	134,000	1,059,000	3,815,000	3,790,000
Germany	.....	.....	.....	35,000
France	.....	.....	176,000	.....
Belgium	.....	.....	.....	14,000
United States	2,231,000	1,085,000	10,106,000	8,126,000
Singapore	427,000	417,000	2,963,000	2,302,000
Japan	.....	.....	179,000	184,000
Australia	.....	3,000	.....	49,000
Other countries	27,000	.....	202,000	.....
Totals	2,876,000	2,930,000	17,620,000	16,712,000
Ports of origin:				
Tandjong Prick	1,550,000	1,273,000	9,148,000	7,937,000
Samarang	17,000	52,000	260,000	246,000
Soerabaya	1,158,000	1,551,000	7,487,000	8,068,000

*Not elsewhere specified.

CRUDE RUBBER ARRIVALS AT ATLANTIC AND PACIFIC PORTS AS STATED BY SHIPS' MANIFESTS

PARAS AND CAUCHO AT NEW YORK

	Fine	Medium	Coarse	Caucho	Totals Pounds
AUGUST 21. By the S. S. *Manchurian Prince*, from Pará.					
H. A. Astlett & Co.	5,600	.....	22,400	11,200	39,200
Poel & Kelly	55,681	.....	11,149	.....	66,830
AUGUST 26. By the S. S. *Gregory*, from Pará.					
Poel & Kelly	33,964	.....	647	.....	34,611
Paul Bertuch	.....	.....	13,095	.....	13,095
Meyer & Brown, Inc.	64,960	.....	2,240	44,800	112,000
H. A. Astlett & Co.	.....	60,500	18,350	7,050	85,900
AUGUST 26. By the S. S. *Gregory*, from Manáos.					
H. A. Astlett & Co.	.....	.....	.....	.....	9,800
Paul Bertuch	.....	43,308	.....	9,275	52,583
J. Aron & Co.	.....	.....	.....	.....	20,678
Various	.....	.....	.....	.....	71,485
AUGUST 28. By the S. S. *Portfield*, from Pará.					
Various	.....	.....	.....	.....	1,372
SEPTEMBER 9. By the S. S. *Siddons*, from Pará.					
G. Amsinck & Co., Inc.	.....	.....	.....	.....	2,156
Various	.....	.....	.....	.....	29,206
SEPTEMBER 10. By the S. S. *Michael*, from Pará.					
Poel & Kelly	58,674	.....	31,450	113,103	203,227
Meyer & Brown, Inc.	.....	107,520	.....	.....	107,520
H. A. Astlett & Co.	.....	.....	16,500	.....	16,500
J. H. Rossbach & Bros.	.....	.....	.....	.....	3,332
Paul Bertuch	.....	.....	.....	88,184	88,184
SEPTEMBER 11. By the S. S. *Lake Ellithorpe*, from Pará.					
Neuss, Hesslein & Co.	22,376	.....	.....	13,523	35,899
Wm. Schall & Co.	62,154	.....	2,240	15,332	79,726
G. Amsinck & Co., Inc.	.....	.....	7,986	.....	7,986
Various	.....	.....	.....	.....	19,822
SEPTEMBER 11. By the S. S. *Lake Ellithorpe*, from Bolivia.					
Wm. Schall & Co.	62,285	.....	2,249	15,363	79,897

PLANTATIONS

(*Figured* 180 *pounds to the bale or case*)

	Shipment from:	Shipped to:	Pounds	Totals
AUGUST 9. By the S. S. *Cross Keys*, at Seattle.				
Thos. A. Desmond & Co.	Singapore	Seattle	60,480	60,480
AUGUST 19. By the S. S. *Boveric*, at New York and Boston.				
Hood Rubber Co.	Colombo	Watertown	65,620	
L. Littlejohn & Co., Inc.	Colombo	New York	156,800	222,420
AUGUST 20. By the S. S. *Amazon*, at San Francisco.				
Firestone Tire & Rubber Co.	Singapore	Akron	112,680	112,680

	Shipment from:	Shipped to:	Pounds	Totals
AUGUST 21. By the S. S. *Sanuki Maru*, at New York and Boston.				
Baring Brothers	Colombo	New York	151,200	
Hood Rubber Co.	Colombo	Watertown	9,360	
Meyer & Brown, Inc.	Colombo	New York	280,000	440,560
AUGUST 23. By the S. S. *City of Manila*, at New York and Boston.				
Hood Rubber Co.	Colombo	Watertown	16,631	
L. Littlejohn & Co., Inc.	Colombo	New York	403,200	419,831
AUGUST 26. By the S. S. *Caronia*, at New York.				
Various	Liverpool	New York	1,800	1,800
AUGUST 27. By the S. S. *Lyons Maru*, at New York.				
L. Littlejohn & Co., Inc.	Colombo	New York	147,180	147,180
AUGUST 28. By the S. S. *Romeo*, at New York and Boston.				
Hood Rubber Co.	Colombo	Watertown	1,700	
Hadden & Co.	Colombo	New York	22,320	
Frazar & Co.	Colombo	New York	44,740	
Chas. T. Wilson Co., Inc.	Colombo	New York	32,400	
L. Littlejohn & Co., Inc.	Colombo	New York	180,800	
Various	Colombo	New York	536,900	818,860
AUGUST 28. By the S. S. *West Columb*, at New York.				
Aldens' Successors, Inc.	Singapore	New York	107,640	
Wm. Brandt & Sons.	Singapore	New York	75,780	
Goldman, Sachs & Co.	Singapore	New York	201,600	
Mitsubishi Goshi Kaisha.	Singapore	New York	55,980	
William H. Stiles & Co.	Singapore	New York	50,000	
L. Littlejohn & Co., Inc.	Singapore	New York	649,800	
Meyer & Brown, Inc.	Singapore	New York	302,400	
Various	Singapore	New York	990,160	
X. W. Obalski & Co., Inc.	Batavia	New York	26,100	
Chas. T. Wilson Co., Inc.	Batavia	New York	72,720	
The Fisk Rubber Co.	Batavia	Chicopee Falls	13,860	
Fred Stern & Co.	Batavia	New York	167,040	
Winter, Ross & Co.	Batavia	New York	18,900	
Various	Batavia	New York	164,520	
Various	Soerabaya	New York	133,200	
L. Littlejohn & Co., Inc.	Colombo	New York	147,060	
Various	Colombo	New York	231,480	3,408,240
AUGUST 30. By the S. S. *Mandasan Maru*, at Seattle.				
Mitsui & Co., Ltd.	Kobe	Seattle	162,000	162,000
SEPTEMBER 1. By the S. S. *Volumnia*, at New York.				
The Goodyear Tire & Rubber Co.	London	Akron	585,900	
T. D. Downing & Co.	London	New York	57,960	
Fisk Rubber Co.	London	Chicopee Falls	185,277	
Various	London	New York	168,673	997,810
SEPTEMBER 1. By the S. S. *West Ira*, at San Francisco.				
Various	Kobe	San Francisco	90,000	90,000
SEPTEMBER 2. By the S. S. *Arakan*, at San Francisco.				
Spreckels "Savage" Tire Corp.	Batavia	San Diego	43,920	43,920
SEPTEMBER 2. By the S. S. *City of Colombo*, at New York.				
Hood Rubber Co.	London	Watertown	56,540	
Hood Rubber Co.	Singapore	Watertown	89,700	146,240
SEPTEMBER 3. By the S. S. *Haleric*, at New York and Boston.				
Chas. T. Wilson Co., Inc.	Colombo	New York	3,780	
Hood Rubber Co.	Colombo	Watertown	22,710	
Baring Brothers	Colombo	New York	340,200	
Poel & Kelly	Colombo	New York	200,160	
L. Littlejohn & Co., Inc.	Colombo	New York	22,400	
Meyer & Brown, Inc.	Colombo	New York	358,400	947,650
SEPTEMBER 2. By the S. S. *Ryndam*, at New York.				
L. Littlejohn & Co., Inc.	Singapore	New York	11,274	11,274
SEPTEMBER 3. By the S. S. *City of Newcastle*, at New York and Boston.				
Hood Rubber Co.	Colombo	Watertown	9,720	
Chas. T. Wilson Co., Inc.	Colombo	New York	35,640	
General Rubber Co.	Colombo	New York	180	
Thornett & Fehr, Inc.	Colombo	New York	11,520	
L. Littlejohn & Co., Inc.	Colombo	New York	44,800	
Edward Maurer Co., Inc.	Colombo	New York	55,980	
E. S. Kuh & Valk Co.	Colombo	New York	51,300	
Meyer & Brown, Inc.	Colombo	New York	35,840	
Various	Colombo	New York	110,500	355,480
SEPTEMBER 8. By the S. S. *Madioen*, at New York.				
Aldens' Successors, Inc.	Soerabaya	New York	183,060	
L. Littlejohn & Co., Inc.	Java	New York	403,200	
The United Malaysian Rubber Co., Ltd.	Borneo	New York	11,200	
Various	Belawan-Deli	New York	76,680	
Manhattan Rubber Mfg. Co.	Batavia	New York	27,000	
Robertson, Cole & Co.	Batavia	New York	35,280	
Various	Batavia	New York	402,300	1,138,720
SEPTEMBER 8. By the S. S. *Bolton Castle*, at New York.				
Hood Rubber Co.	Singapore	Watertown	56,100	56,100
SEPTEMBER 8. By the S. S. *Telemachus*, at New York.				
Hood Rubber Co.	London	Watertown	19,956	
Hood Rubber Co.	Singapore	Watertown	112,000	
William H. Stiles & Co.	Singapore	New York	100,000	231,956
SEPTEMBER 9. By the S. S. *Wheatland Montana*, at Seattle.				
Thos. A. Desmond & Co.	Singapore	Seattle	90,720	90,720
SEPTEMBER 9. By the S. S. *Deucalion*, at New York.				
Hood Rubber Co.	Singapore	Watertown	218,700	
New York Overseas Co.	Singapore	New York	55,800	
F. R. Henderson & Co.	Singapore	New York	253,980	
J. Aron & Co.	Singapore	New York	32,400	
Thornett & Fehr, Inc.	Singapore	New York	22,320	
W. R. Grace & Co.	Singapore	New York	432,360	
Meyer & Brown, Inc.	Singapore	New York	291,200	
L. Littlejohn & Co., Inc.	Singapore	New York	448,000	
E. S. Kuh and Valk Co.	Singapore	New York	233,740	
Van Miel-Nordheim Corp.	Singapore	New York	22,500	
A. C. Fox & Co.	Singapore	New York	10,080	
Mitsui & Co., Limited.	Singapore	New York	100,800	
Pell & Dumont, Inc.	Singapore	New York	30,240	
Eastern Rubber Co.	Singapore	New York	80,640	
Chas. T. Wilson Co., Inc.	Singapore	New York	167,400	
W. T. Sargent & Sons.	Singapore	New York	20,520	
Poel & Kelly.	Singapore	New York	197,460	
Fred Stern & Co.	Singapore	New York	24,300	
The Fisk Rubber Co.	Singapore	Chicopee Falls	201,032	
William H. Stiles & Co.	Singapore	New York	50,000	
Various	Singapore	New York	959,260	
F. R. Henderson & Co.	Port Dickson	New York	24,120	
Various	Port Dickson	New York	14,580	
Various	Pt. Sw't'nh'm	New York	60,840	
Poel & Kelly	Malacca	New York	11,700	
Various	Philippine Ils.	New York	10,980	
General Rubber Co.	Telok Naboeng	New York	1,108,260	
F. R. Henderson & Co.	Penang	New York	209,520	
W. R. Grace & Co.	Penang	New York	162,360	
The Goodyear Tire & Rubber Co.	Penang	Akron	66,800	
The B. F. Goodrich Co.	Penang	Akron	153,000	
Edward Boustead & Co.	Penang	New York	27,000	
Joosten & Janssen, *as agents*	Penang	New York	82,600	
Various	Penang	New York	18,720	
Various	Teluk Anson	New York	25,020	
Poel & Kelly	Deli	New York	14,400	
Alden's Successors, Inc.	Deli	New York	37,080	
Irwin-Harrisons & Crosfield, Inc.	Deli	New York	268,380	
The Fisk Rubber Co.	Deli	Chicopee Falls	57,240	
W. R. Grace & Co.	Deli	New York	181,260	
East Asiatic Co., Inc.	Deli	New York	59,040	
Various	Deli	New York	75,780	6,521,412
SEPTEMBER 10. By the S. S. *Tenyo Maru*, at San Francisco.				
Thos. A. Desmond & Co.	Hongkong	New York	10,080	10,080
SEPTEMBER 10. By the S. S. *Ubbekarspel*, at New York.				
Joosten & Janssen, *as agents*	Rotterdam	New York	7,000	7,000
SEPTEMBER 13. By the S. S. *John Roach*, at New York.				
Fred Stern & Co.	Soerabaya	New York	18,180	
Kuharah Trading Co., Ltd.	Soerabaya	New York	38,880	
Various	Soerabaya	New York	122,760	
F. R. Henderson & Co.	Batavia	New York	79,920	
L. Littlejohn & Co., Inc.	Singapore	New York	336,000	
Goldman, Sachs & Co.	Batavia	New York	9,000	
Winter, Ross & Co.	Batavia	New York	55,980	
Fred Stern & Co.	Batavia	New York	11,520	
Poel & Kelly	Batavia	New York	30,240	
William H. Stiles & Co.	Singapore	New York	40,000	
Various	Batavia	New York	47,880	
H. A. Astlett & Co.	Singapore	New York	56,000	
Meyer & Brown, Inc.	Singapore	New York	11,200	
Various	Singapore	New York	1,079,130	1,936,690
SEPTEMBER 14. By the S. S. *Bessie Dollar*, at New York.				
Thornett & Fehr, Inc.	Singapore	New York	154,800	
Wm. Brandt & Sons	Singapore	New York	123,840	
F. R. Henderson & Co.	Singapore	New York	195,300	
Edward Maurer Co., Inc.	Singapore	New York	29,880	
L. Littlejohn & Co., Inc.	Singapore	New York	179,200	
W. R. Grace & Co.	Singapore	New York	139,140	
William H. Stiles & Co.	Singapore	New York	10,000	
Winter, Ross & Co.	Singapore	New York	50,400	
Baird Rubber & Trading Co.	Singapore	New York	67,840	
Whittall & Co. of Ceylon.	Singapore	New York	27,200	
Various	Singapore	New York	412,500	1,390,100
SEPTEMBER 14. By the S. S. *West Sequana*, at San Francisco.				
Pioneer Rubber Co.	Singapore	San Francisco	24,480	24,480
SEPTEMBER 17. By the S. S. *Alaska Maru*, at New York.				
Hood Rubber Co.	Singapore	Watertown	326,428	326,428
SEPTEMBER 20. By the S. S. *Amazon Maru*, at New York.				
Firestone Tire & Rubber Co.	Belawan	Akron	118,980	
Various	Belawan	New York	137,340	
Hood Rubber Co.	Singapore	Watertown	1,737,900	
Chas. T. Wilson Co., Inc.	Singapore	New York	181,440	
L. Littlejohn & Co., Inc.	Singapore	New York	89,800	
W. R. Grace & Co.	Singapore	New York	210,240	
Various	Singapore	New York	163,260	2,638,960
BALATA				
AUGUST 27. By the S. S. *Hebe*, at New York.				
Wm. Schall & Co.	Dutch Guiana	New York	12,225	12,225
AUGUST 30. By the S. S. *Matura*, at New York.				
Thos. Scott & Co.	Trinidad	New York	600	600
SEPTEMBER 1. By the S. S. *Volumnia*, at New York.				
Earle Brothers	London	New York	22,500	22,500
SEPTEMBER 4. By the S. S. *General G. W. Goethals*, at New York.				
P. R. Rincones, Jr., Co.	Cristobal	New York	6,150	6,150
SEPTEMBER 18. By the S. S. *Lake View*, at New York.				
Middleton & Co., Ltd.	Paramaribo	New York	3,307	3,307
SEPTEMBER 21. By the S. S. *Grangepark*, at New York.				
Ultramares Corp.	Cristobal	New York	2,548	
J. S. Sembrada & Co.	Cristobal	New York	1,862	
American Trading Co.	Cristobal	New York	2,254	6,664
CENTRALS				
AUGUST 22. By the S. S. *Essequibo*, at New York.				
Mecke & Co.	Valparaiso	New York	3,300	3,300
AUGUST 28. By the S. S. *Hebe*, at New York.				
Arkell & Douglas, Inc.	Paramaribo	New York	15,000	15,000
AUGUST 28. By the S. S. *Cristobal*, at New York.				
A. M. Capen's Sons, Inc.	Cristobal	New York	2,100	
Isaac Brandon & Bros.	Cristobal	New York	150	2,250

CENTRALS—Continued

	Shipment from:	Shipped to:	Pounds	Totals
AUGUST 30. By the S. S. *Matura*, at New York.				
G. Amsinck & Co., Inc..	Trinidad	New York	36,750	
Southern Sales Corp...	Trinidad	New York	27,300	
South and Central America Com. Co....	Trinidad	New York	19,350	
Various	Trinidad	New York	48,300	131,700
SEPTEMBER 7. By the S. S. *Caldas*, at New York.				
R. Echavarria & Co....	Cartagena	New York	3,000	3,000
SEPTEMBER 8. By the S. S. *Allianca*, at New York.				
G. Amsinck & Co., Inc.	Cristobal	New York	1,050	1,050
SEPTEMBER 21. By the S. S. *Grangepark*, at New York.				
G. Amsinck & Co., Inc.	Cristobal	New York	2,550	
Chas. E. Griffin.....	Cristobal	New York	6,000	
H. S. Wolff & Co.....	Cristobal	New York	1,650	
Various	Cristobal	New York	6,450	16,650
AFRICANS				
SEPTEMBER 7. By the S. S. *Nieuw Amsterdam*, at New York.				
Poel & Kelly.....	Rotterdam	New York	690	690
SEPTEMBER 12. By the S. S. *Caronia*, at New York.				
Meyer & Brown, Inc...	Liverpool	New York	11,200	11,200
SEPTEMBER 13. By the S. S. *Kroonland*, at New York.				
Gillespie Bros. & Co....	Antwerp	New York	103,845	103,845
SEPTEMBER 18. By the S. S. *Burmese Prince*, at New York.				
Pitt & Scott.....	Havre	New York	150,120	150,120
SEPTEMBER 20. By the S. S. *Meissonier*, at New York.				
Meadows, Wye & Co....	Havre	New York	18,745	18,745
SEPTEMBER 20. By the S. S. *Clan Buchanan*, at New York.				
Various	Mombasa	New York	6,120	6,120
MANICOBAS				
SEPTEMBER 13. By the S. S. *St. Michael*, at New York.				
J. H. Rossbach & Bros..	Pernambuco	New York	57,640	57,640
GUTTA PERCHA				
SEPTEMBER 20. By the S. S. *Amazon Maru*, at New York.				
L. Littlejohn & Co., Inc.	Singapore	New York	12,000	12,000
GUTTAS				
SEPTEMBER 8. By the S. S. *Madioen*, at New York.				
The United Malaysian Rubber Co., Ltd.....	Borneo	New York	145,207	145,207
PONTIANAK				
SEPTEMBER 8. By the S. S. *Madioen*, at New York.				
The United Malaysian Rubber Co., Ltd.....	Borneo	New York	9,508	9,508
SEPTEMBER 9. By the S. S. *Deucalion*, at New York.				
Various	Singapore	New York	472,500	472,500
SEPTEMBER 13. By the S. S. *Amazon Maru*, at New York.				
Konig Bros. & Co.....	Singapore	New York	32,700	
Shawmut Corp. of Boston	Singapore	New York	103,200	
Various	Singapore	New York	60,000	195,900
GUAYULE				
AUGUST 27. By rail at Eagle Pass, Texas.				
Continental Rubber Co. of New York.....	Mexico	Akron	70,000	70,000
SEPTEMBER 2. By rail at Eagle Pass, Texas.				
Continental Rubber Co. of New York.....	Mexico	New York	55,000	
Continental Rubber Co. of New York.....	Mexico	Akron / Atlanta	55,000	110,000

CUSTOM HOUSE STATISTICS

PORT OF NEW YORK

IMPORTS

	July 1919 Pounds	July 1919 Value	July 1920 Pounds	July 1920 Value
UNMANUFACTURED—*free:*				
Crude rubber:				
From France	.....	.....	197,165	$67,798
Netherlands	.....	.....	692,369	280,188
Portugal	.....	.....	509,146	169,974
Turkish Europe..	.....	.....	3,440	927
England	666,822	$305,218	3,369,347	1,471,548
Canada	45,246	19,456	.....	.....
Costa Rica.....	1,512	809	3,280	878
Uruguay	.....	.....	24,116	5,300
Trinidad	2,757	914	.....	.....
Nicaragua	14,967	4,426	15,680	4,341
Panama	3,543	852	9,504	2,699
Salvador	5,332	2,500	3,335	911
Mexico	1,155	252	12,370	3,570
Bolivia	.....	.....	27,539	11,252
Brazil	2,055,583	579,257	3,529,968	920,488
Colombia	41,622	15,817	86,983	27,689
Ecuador	.....	.....	18,337	5,301
Peru	.....	.....	635,093	220,873
Venezuela	137,940	52,146	79,751	24,149
British India.....	.....	.....	134,830	44,989
Straits Settlements	31,385,984	13,004,755	20,498,110	9,809,130
British E. Indies.	2,311,729	909,270	2,844,299	1,174,374
Dutch E. Indies..	7,854,478	3,251,302	9,834,653	4,474,469
China	.....	.....	37,660	21,176
Japan	.....	.....	33,600	13,555
Philippines	644,934	256,188	17,046	5,550
British S. Africa.	.....	.....	2,738	685
Egypt	.....	.....	17,940	6,997
Totals	45,173,624	$18,403,162	42,638,299	$18,768,761

	July 1919 Pounds	July 1919 Value	July 1920 Pounds	July 1920 Value
UNMANUFACTURED—*free:*				
Crude rubber:				
Jelutong (Pontianak):				
From Netherlands	.....	.....	414,400	$50,806
Japan	40,000	$4,000	.....	.....
Straits Settlements	2,729,213	365,839	875,773	154,748
Dutch E. Indies.	1,203,855	64,075	234,884	40,290
Totals	3,973,068	$433,914	1,525,057	$245,844
Gutta percha:				
From England	.....	.....	1,141	$351
Trinidad	.....	.....	200	42
Brazil	.....	.....	37,831	5,162
Straits Settlements	1,038,794	$168,547	555,363	146,108
Dutch E. Indies.	218,079	29,735	250,417	38,445
Philippines	7,491	1,750	.....	.....
Totals	1,264,364	$200,032	844,952	$190,108
Balata:				
From England	35,840	$35,250	.....	.....
Panama	17,412	5,823	4,782	$1,673
Brazil	.....	.....	1,513	885
Colombia	7,292	3,546	22,373	15,456
British Guiana...	7 466	6,271	.....	.....
Dutch Guiana...	.....	.....	7,055	5,245
Venezuela	37,422	35,214	.....	.....
Peru	.....	.....	7,570	2,331
Totals	105,432	$86,104	43,293	$25,590
Reclaimed and scrap rubber	535,180	$40,776	1,014,970	$103,663
Totals, unmanufactured	51,051,668	$19,163,988	46,066,571	$19,333,966
Manufactures of rubber and gutta percha	.....	$39,575	.....	$141,898
Chicle .....*dutiable*	511,576	302,255	748,815	535,289
EXPORTS OF DOMESTIC MERCHANDISE				
MANUFACTURED:				
Automobile tires.....	.....	$1,377,128	.....	$2,544,733
Inner tubes	.....		.....	228,208
Solid tires	.....		.....	160,698
All other tires.....	.....	32,992	.....	61,460
Belting	.....	272,318	.....	148,944
Hose	.....		.....	120,469
Packing	.....		.....	57,046
Rubber boots .....*pairs*	5,943	14,894	1,783	6,108
Rubber shoes.....*pairs*	83,390	66,577	338,457	364,158
Soles and heels.....	.....	.....	.....	45,382
Druggists' sundries.....	.....	56,710	.....	134,316
Other mfrs. of rubber...	.....	247,806	.....	320,321
Totals manufactured.	89,333	$2,068,425	340,240	$4,191,843
Insulated wire.....	.....	$638,775	.....	$430,514
Fountain pens....*number*	35,296	43,981	28,851	28,662
Suspenders and garters..	.....	149,262	.....	293,631
Chewing gum	.....	80,800	.....	97,696
UNMANUFACTURED—*free:*				
Reclaimed and scrap rubber	687,531	90,683	247,381	25,620
FOREIGN EXPORTS				
Crude rubber	23,755	$9,003	35,700	$22,600
Balata	43,127	20,079	27,700	15,675
Jelutong (Pontianak)....	4,200	2,700	.....	.....
Guayule	.....	.....	1,666	1,083
Reclaimed and scrap rubber	.....	.....	1,875	169
Chicle	.....	.....	1,905	4,185
Rubber manufactures....	.....	3,138	.....	225

PORT OF NEW ORLEANS

IMPORTS

	July 1919 Pounds	July 1919 Value	July 1920 Pounds	July 1920 Value
UNMANUFACTURED—*free:*				
Crude rubber:				
Nicaragua	2,602	$678	.....	.....
Guatemala	.....	.....	2,190	$414
Totals	2,602	$678	2,190	$414
Chicle	5,599	4,000	.....	.....
Rubber manufactures, *dutiable*	.....	.....	.....	$562

EXPORTS

	July 1919 Pounds	July 1919 Value	July 1920 Pounds	July 1920 Value
MANUFACTURED:				
Automobile tires	.....	$6,801	.....	$158,592
Inner tubes	.....		.....	71,001
Solid tires	.....		.....	9,837
All other tires.....	.....	358	.....	10,202
Belting	.....	4,266	.....	5,898
Hose	.....		.....	21,914
Packing	.....		.....	8,092
Rubber boots .....*pairs*	.....	.....	6	19
Rubber shoes .....*pairs*	3,553	3,593	35,291	42,573
Soles and heels.....	.....	.....	.....	31,099
Druggists' sundries.....	.....	852	.....	394
Other rubber manufactures	.....	521	.....	14,974
Totals	3,553	$16,391	35,297	$374,615
Insulated wire and cables	.....	$1,753	.....	$11,069
Fountain pens	.....	.....	.....	117
Suspenders and garters..	.....	1,047	.....	8,790
Rubber scrap and reclaimed	183	110	.....	.....
Chewing gum	.....	1,476	.....	1,953
REEXPORTS				
Crude rubber	1,900	$857	.....	.....

PORT OF BOSTON

IMPORTS

July

	1919 Pounds	1919 Value	1920 Pounds	1920 Value
UNMANUFACTURED—*free:*				
Crude rubber:				
From England	11,194	$5,334	28,547	$9,577
Straits Settlements	404,389	138,564	.....	.....
British E. Indies.	.....	.....	48,440	13,994
Totals	415,583	$143,898	76,987	$23,571
Rubber substitutes	.....	.....	.....	$61
Rubber scrap and reclaimed	10,900	$645	.....	.....
Rubber manufactures, *dutiable*	.....	4,425	.....	2,970

EXPORTS

MANUFACTURED:				
Automobile tires	.....	$247	.....	$64,946
Inner tubes	.....		.....	12,402
Solid tires	.....		.....	355
Belting	.....		.....	3,501
Hose	.....	1,466	.....	12,756
Packing	.....		.....	668
Rubber boots .....*pairs*	4,625	11,595	3,508	11,622
Rubber shoes .....*pairs*	13,637	10,708	247,703	219,281
Soles and heels	.....	.....	.....	13,111
Druggists' sundries	.....	.....	.....	193
Other rubber manufactures	.....	62,793	.....	51,241
Totals	18,262	$86,809	251,211	$390,076
Insulated wire and cables.	.....	$1,484	.....	$13,202
Fountain pens....*number*	.....	.....	15	26
Suspenders and garters..	.....	17,797	.....	13,019
Rubber scrap	41,948	4,124	73,866	5,356

REEXPORTS

Balata	1,530	$520	.....	.....

PORT OF SEATTLE

IMPORTS

UNMANUFACTURED—*free:*				
Crude rubber:				
From Canada	15	$15	.....	.....
Straits Settlements	1,374,855	487,615	.....	.....
British E. Indies.	11,200	4,215	.....	.....
Dutch E. Indies.	579,537	250,171	.....	.....
Japan	56,180	14,081	222,400	$80,464
Totals	2,021,787	$756,097	222,400	$80,464
Jelutong (Pontianak)	23,114	$2,311	.....	.....
Rubber manufactures....	.....	6	.....	$88

EXPORTS

MANUFACTURED:				
Casings	.....	.....	.....	$11,630
Automobile tires	.....	$12,177	.....	2,475
Inner tubes	.....		.....	2,284
Solid tires	.....		.....	2,475
All other tires	.....	753	.....	7,161
Belting	.....	14,712	.....	9,718
Hose	.....		.....	2,969
Packing	.....		.....	366
Rubber boots .....*pairs*	6,113	20,826	.....	724
Rubber shoes .....*pairs*	25,128	28,376	.....	50
Druggists' sundries	.....	998	.....	309
Other rubber manufactures	.....	4,805	.....	4,200
Totals	31,241	$82,647	.....	$44,361
Insulated wire and cables	.....	$3,153	.....	$66
Fountain pens....*number*	94	114	361	269
Suspenders	.....	4,393	.....	1,122
Chewing gum	.....	163	.....	348
Rubber scrap and reclaimed	73,073	3,586	2,086	83

REEXPORTS

Crude rubber	581	$258	.....	.....

PORT OF SAN FRANCISCO

IMPORTS

UNMANUFACTURED—*free:*				
Crude rubber:				
From Straits Settlements	1,080,262	$386,536	938,825	$456,004
British Oceania..	.....	.....	3,476	1,696
Dutch E. Indies..	273,692	101,265	999,867	402,026
Totals	1,353,954	$487,801	1,942,168	$859,726
Jelutong (Pontianok)...	4,763	$1,381	.....	.....
Chicle	29,168	36,168	.....	.....
Rubber manufactures....	.....	657	.....	$84

EXPORTS

MANUFACTURED:				
Automobile tires	.....	$54,399	.....	$760,276
Inner tubes	.....		.....	53,958
Solid tires	.....		.....	30,763
All other tires	.....	769	.....	34,247
Belting	.....	27,619	.....	83,795
Hose	.....		.....	40,854
Packing	.....		.....	50,085
Rubber boots .....*pairs*	.....	.....	6,057	19,129
Rubber shoes .....*pairs*	360	263	16,471	21,208
Soles and heels	.....	.....	.....	2,526
Druggists' sundries	.....	781	.....	4,149
Other rubber manufactures	.....	11,395	.....	53,142
Totals	360	$95,226	22,528	$1,154,132
Insulated wire and cables	.....	$256	.....	$2,277
Fountain pens ...*number*	1,587	1,590	.....	.....
Suspenders	.....	.....	.....	.....
Chewing gum	.....	2,911	.....	2,160
UNMANUFACTURED—*free:*				
Reclaimed and scrap rubber	20,000	$800	17,720	$710

REEXPORTS

Rubber manufactures....	.....	.....	.....	$4

RUBBER STATISTICS FOR THE DOMINION OF CANADA

IMPORTS OF CRUDE AND MANUFACTURED RUBBER

May

	1919 Pounds	1919 Value	1920 Pounds	1920 Value
UNMANUFACTURED—*free:*				
Rubber, gutta percha, etc.:				
From United Kingdom	209,000	$101,623	647,441	$358,376
United States	321,887	139,719	584,654	248,669
Belgian Congo	.....	.....	33,400	17,434
Brazil	46,305	25,352	129,506	64,146
British East Indies:				
Ceylon	315,104	162,226	.....	.....
India	.....	.....	33,493	16,760
Straits Settlements	940,289	455,575	508,740	265,161
Other countries	.....	.....	66,336	32,878
Totals	1,832,585	$884,495	2,003,570	$1,003,424
Balata	.....	.....	51	$74
Rubber, recovered	179,771	$29,667	358,705	65,593
Rubber, powdered, and rubber or gutta percha scrap	93,671	4,596	313,936	22,524
Rubber substitutes	28,562	4,145	107,001	14,917
Totals, unmanufactured..	2,134,589	$922,903	2,783,263	$1,106,532
PARTLY MANUFACTURED—				
Hard rubber sheets and rods.	110,138	$65,808	7,733	$5,127
Hard rubber tubes	.....	2,212	.....	4,365
Rubber thread, not covered..	6,761	9,972	3,017	4,491
Totals, partly manufactured	116,899	$77,992	10,750	$13,983
MANUFACTURED—				
Belting	.....	$10,517	.....	$17,405
Hose	.....	10,708	.....	12,914
Packing	.....	9,144	.....	5,704
Boots and shoes	.....	16,592	.....	19,494
Clothing, including waterproofed	.....	19,672	.....	19,463
Gloves	.....	994	.....	1,237
Hot water bottles	.....	1,941	.....	2,913
Tires, solid	.....	13,390	.....	37,505
Tires, pneumatic	.....	103,267	.....	116,839
Tires, inner tubes	.....	13,196	.....	13,034
Other manufactures	.....	183,669	.....	288,999
Totals, manufactured	.....	$383,090	.....	$535,507
Totals, rubber imports...	.....	$1,383,985	.....	$1,656,022
Insulated wire and cables:				
Wire and cables covered with cotton, linen, silk, rubber, etc.	.....	$12,742	.....	$21,824
Copper, wire and cables, covered as above	.....	5,075	.....	17,690
Chicle	149,869	98,724	34,088	17,536

EXPORTS OF DOMESTIC AND FOREIGN RUBBER GOODS

May

	1919 Produce of Canada Value	1919 Reexports of Foreign Goods Value	1920 Produce of Canada Value	1920 Reexports of Foreign Goods Value
UNMANUFACTURED—				
Crude and waste rubber	$63,020	$400	$22,738	.....
MANUFACTURED—				
Belting	.....	.....	$7,195	.....
Hose	$5,811	.....	9,377	.....
Boots and shoes	31,460	.....	66,455	$115
Clothing, including waterproofed	3,568	$204	4,282	509
Tires, pneumatic	407,084	1,000	587,475	7,064
Tires, other kinds	6,264	.....	1,987	.....
Other manufactures	23,370	7,680	30,802	348
Totals, manufactured	$477,557	$8,884	$707,573	$8,036
Total rubber exports	$540,577	$9,284	$730,311	$8,036
Insulated wire and cables:				
Copper wire and cable	$287,813	.....	$17,922	.....
Chicle	73,049	.....	.....	.....

EXPORTS OF INDIA RUBBER MANUFACTURES AND INSULATED WIRE AND CABLE FROM THE UNITED STATES BY COUNTRIES, DURING THE MONTH OF JULY, 1920

EXPORTED TO—	Belting Value	Hose Value	Packing Value	Boots		Shoes		Soles and Heels Value	Automobile Tires				Insulated Wire and Cables Value	Druggists' Rubber Sundries Value	All Other Manufactures of Rubber Value	Totals Value
				Pairs	Value	Pairs	Value		Casings Value	Inner Tubes Value	Solid Tires Value	All Others Value				
EUROPE:																
Austria									$404							$404
Azores and Madeira Islands								$90							$12	102
Belgium		$9	$1,032						85,841	$4,208			$986	$823	1,340	94,239
Czechoslovakia									154							154
Denmark			531			8,176	$7,552	2,191	19,416	1,543	$1,120		1,200	750	5,043	39,346
Finland	$335		1,343			33,954	38,598		18,997	622		$11,500		279	2,618	74,292
France	9,708	990	34			13,828	8,748		115,459	306			4,036	559	32,015	171,855
Germany		2,292							22,589	2,349					2,834	30,064
Gibraltar						192	183		127							310
Greece									6,369	512	1,300			2,531	482	11,194
Italy		5,079		253	$921	8,400	6,762	8,589	10,457	8,050		145	6,976	1,867	9,263	58,109
Netherlands	4,918	1,089				999	937	503	209,825	11,627		626	27,586	6,098	6,302	269,511
Norway	1,480	9,844	152			67,775	73,015	530	210,939	11,190	26,702	4,291	11,948	598	8,508	359,197
Poland and Danzig				30	104	112	148		14,345	6,200	300		14,430	125	813	36,465
Portugal		449							3,607	913			3,090	265	8	8,332
Russia in Europe				10	100	6,150	11,000		600	90				100		11,890
Spain								1,288	151,539	15,995	46,233	185	3,251	19,037	5,321	242,849
Sweden	8,418	5,818	26			28,757	28,328	680	305,520	38,546	11,602	12,058	12,170	39,712	4,657	467,535
Switzerland						1,836	2,100		7,655	1,823			3,521		4,350	19,449
Turkey in Europe						3,906	7,506									7,506
England	1,796	31,037	7,923	1,272	3,067	197,624	172,518	7,869	577,625	31,664	659	12,703	32,795	20,631	115,987	1,016,274
Scotland			1,600			9,978	7,762		13,884	342						23,588
Ireland									173	40						213
Yugoslavia, Albania, etc.									3,866	605						4,471
TOTALS, EUROPE	$26,655	$56,607	$12,641	1,565	$4,192	381,687	$365,157	$21,740	$1,779,391	$136,625	$87,916	$41,508	$121,989	$93,375	$199,553	$2,947,349
NORTH AMERICA:																
Bermuda		$450	$136			609	$822	$223	92						$89	$1,812
British Honduras		35	35			2,599	3,689		996	$88				$69	554	5,466
Canada	$31,073	10,024	10,410	2,819	$11,896	15,657	17,119	552	41,441	5,475	$19,690	$3,367	$23,329	30,862	266,786	472,024
Costa Rica	1,576	2,096				120	80	1,046	639	92			1,099	321	2,412	9,361
Guatemala		39	76			2,077	3,307	783	4,232	2,756	436		4,427	484	1,011	17,551
Honduras	300	861	644			1,374	1,865	321	1,537	327			1,520	105	1,168	8,648
Nicaragua	3,249	810	402	6	19	1,836	2,013	1,551	3,001	67	350		542	510	1,846	14,360
Panama	1,360	2,050	554			8,681	9,566	2,298	37,863	21,048	7,229	8,606	28,609	247	4,211	123,641
Salvador	1,607	238						1,167	4,756	643			971	278	310	9,970
Greenland															404	404
Mexico	34,141	55,699	29,546	10	49	41,802	47,618	7,966	98,730	16,419	6,884	2,189	46,816	6,708	48,985	401,750
Miquelon, Langley, etc.															150	150
Newfoundland and Labrador	3,501	1,773		5,744	21,213	528	616	606	2,533	245	67	216	1,926	389	1,140	34,225
Barbados						96	226	59	2,540	252		15	83		423	3,598
Jamaica		105				1,263	2,272	453	40,053	2,519		204	1,583	69	794	48,052
Trinidad and Tobago	281	452	115			3,091	3,029	1,150	26,704	3,279	7,000		112	269	5	42,396
Other British West Indies	73					1,490	2,150	15	1,163	137		12	20	18	318	3,906
Cuba	6,821	19,821	19,971			47,590	47,167	28,772	150,753	52,670	13,842	931	25,729	8,256	23,591	398,324
Virgin Islands of U. S.						567	777		254	120			56	120	44	1,371
Dutch West Indies		5	28			2,950	4,074	54	80	140		30		139	270	4,820
French West Indies	1,266	21							290		235		22		21	1,855
Haiti		54	100			202	210	217	7,293	1,503			909	133	354	10,773
Dominican Republic	71	312	92			1,318	2,399	709	4,462	3,535	741	1,084	893	472	2,353	17,123
TOTALS, NORTH AMERICA	$85,319	$94,845	$62,109	8,579	$33,177	133,850	$148,999	$47,942	$429,412	$111,515	$56,474	$16,654	$138,646	$49,449	$357,239	$1,631,580
OCEANIA:																
Australia	$2,825	$10,727	$7,522	36	$297	5,221	$3,419		$264,504	$20,296	$407	$11,030	$4,276	$1,471	$17,694	$344,468
New Zealand	12,021	5,689	6,278	6,821	23,222	264	485	$552	367,172	22,921	20,139	24,787	953	1,076	17,930	503,225
Other British Oceania		895				490	632		1,170	100			80		29	2,906
French Oceania		33	13	4	16	2,986	4,395		1,525	193	197	229		54	143	6,798
Other Oceania						260	300		475			303			25	1,103
Philippine Islands	26,735	15,686	16,051	154	683	48,181	58,044	3,637	315,966	23,994	18,860	9,348	85,574	3,158	32,642	610,378
TOTALS, OCEANIA	$41,581	$33,030	$29,864	7,015	$24,218	57,402	$67,275	$4,189	$950,812	$67,504	$39,603	$45,697	$90,883	$5,759	$68,463	$1,468,878
SOUTH AMERICA:																
Argentina	$36,329	$16,650	$7,385	144	$725	23,236	$26,697	$2,148	$144,634	$18,431	$6,165	$8,052	$35,895	$5,286	$18,243	$326,640
Bolivia	600	723	55						1,150				405	400	365	3,698
Brazil	7,064	7,184	1,586	1	6	13,292	12,822	28,567	266,776	67,189	6,264	10,328	36,392	6,390	14,581	465,149
Chile	7,550	15,444	103			3,820	3,154	117	53,152	14,230	2,595	450	2,292	3,919	6,067	109,073
Colombia	5,351	487	26	12	40	924	1,069	1,807	10,997	2,080	132	580	4,466	1,796	6,604	35,435
Ecuador		1,572	75			1,140	1,179		455					185	458	3,924
British Guiana						3,936	5,322		3,267	145		418	63		702	9,917
Dutch Guiana									60	26						86
French Guiana															225	225
Peru	2,902	1,629	1,766			172	184		18,635	3,551	3,000		7,439	4,334	2,793	46,233
Uruguay	4,771	439	100			13,661	12,394	2,790	81,657	7,510	350	53	3,607	3,255	5,039	121,965
Venezuela	1,139	665	1,569					806	21,601	5,252	89	3,758	656	5,859	4,636	46,030
TOTALS, SOUTH AMERICA	$65,706	$44,793	$12,665	157	$771	60,181	$62,821	$36,235	$602,384	$118,414	$18,595	$23,639	$91,215	$31,424	$59,713	$1,168,375

Uruguay	4,771	439	100	.....	.....	13,601	12,594	2,790	21,697	7,310	350	35	3,607	3,255	3,039	121,963
Venezuela	1,139	665	1,569	.....	.....	.....	.....	806	21,601	5,252	89	3,758	656	5,859	4,636	46,030
TOTALS, SOUTH AMERICA	$65,706	$44,793	$12,665	157	$771	60,181	$62,821	$36,235	$602,384	$118,414	$18,595	$23,639	$91,215	$31,424	$59,713	$1,168,375

EXPORTED TO—	Belting Value	Hose Value	Packing Value	Boots Pairs	Boots Value	Shoes Pairs	Shoes Value	Soles and Heels Value	Automobile Tires: Casings Value	Automobile Tires: Inner Tubes Value	Automobile Tires: Solid Tires Value	Automobile Tires: All Others Value	Insulated Wire and Cables Value	Druggists' Rubber Sundries Value	All Other Manufactures of Rubber Value	Totals Value
ASIA:																
China	$6,254	$4,840	$4,727	.....	.....	1,056	$1,190	$94	$63,385	$1,988	$909	.....	$76,124	$2,001	$12,038	$173,550
Chosen	.....	.....	99	.....	.....	21	32	.....	3,824	530	.....	.....	.....	44	.....	4,529
British India	13,518	2,002	578	1	$7	3,404	5,913	350	123,350	9,881	12,733	$7,000	368	2,850	6,579	185,129
Straits Settlements	.....	312	.....	.....	.....	2,849	2,874	.....	110,700	4,988	8,170	.....	.....	263	6,412	133,719
Other British East Indies	.....	.....	.....	.....	.....	362	401	.....	1,066	156	.....	.....	.....	21	1,729	3,373
Dutch East Indies	2,454	582	46	.....	.....	.....	.....	17	41,124	4,725	36,210	7,500	32,179	1,818	2,497	129,152
Hongkong	.....	411	821	.....	.....	1,594	1,470	.....	174	19	2,387	.....	1,937	138	2,240	9,597
Japan	53,122	9,964	15,430	960	2,128	19,031	17,678	.....	57,011	3,961	400	7,161	3,777	495	26,243	197,370
Persia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	.....	75
Russia in Asia	.....	.....	.....	12	99	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	99
Siam	.....	.....	.....	.....	.....	.....	.....	.....	1,420	200	600	.....	69	102	.....	2,391
Turkey in Asia	.....	.....	.....	.....	.....	360	453	.....	1,270	390	1,242	.....	.....	.....	2,743	6,098
TOTALS, ASIA	$75,348	$18,111	$21,701	973	$2,234	28,677	$30,011	$461	$403,324	$26,838	$62,651	$21,661	$114,454	$7,807	$60,481	$845,082
AFRICA:																
Belgian Congo	.....	.....	.....	.....	.....	2	2	.....	$56	$10	.....	.....	.....	.....	.....	$68
British West Africa	.....	.....	.....	.....	.....	19	19	.....	31,903	3,477	$300	.....	.....	.....	$7	35,706
British South Africa	$8,488	$1,025	$1,985	.....	.....	5,768	6,059	$2,768	45,440	9,047	206	$1,955	$1,604	$1,107	9,347	89,031
British East Africa	.....	.....	.....	.....	.....	168	175	.....	9,229	.....	.....	.....	.....	.....	602	10,006
Canary Islands	.....	.....	.....	.....	.....	.....	.....	.....	2,500	.....	.....	.....	.....	.....	30	2,530
French Africa	5,491	.....	.....	.....	.....	.....	.....	36	1,909	33	.....	46	.....	.....	.....	7,515
Kamerun, etc.	.....	.....	.....	.....	.....	.....	.....	.....	1,137	150	.....	.....	.....	.....	.....	1,287
Morocco	.....	.....	.....	.....	.....	.....	.....	.....	2,500	.....	.....	.....	.....	.....	.....	2,500
Portuguese Africa	.....	91	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91
Egypt	.....	.....	.....	.....	.....	.....	.....	.....	9,126	.....	.....	.....	.....	.....	52	9,178
TOTALS, AFRICA	$13,979	$1,116	$1,985	.....	.....	5,957	$6,255	$2,804	$103,800	$12,717	$506	$2,001	$1,604	$1,107	$10,038	$157,912
TOTALS	$308,588	$248,502	$140,965	18,289	$64,592	667,754	$680,518	$113,371	$4,269,123	$473,413	$265,745	$151,160	$558,791	$188,921	$755,487	$8,219,176

EXPORTS OF RUBBER GOODS TO NON-CONTIGUOUS TERRITORY OF THE UNITED STATES

	Belting, Hose and Packing, Value	Boots and Shoes: Pairs	Boots and Shoes: Value	Tires: Automobile Value	Tires: All Others Value	Insulated Wire and Cables Value	Druggists' Rubber Sundries Value	All Other Manufactures of Rubber Value	Totals Value
Hawaii	$14,640	.....	.....	$137,031	$2,565	.....	.....	$14,733	$168,969
Porto Rico	9,447	.....	.....	230,738	24,187	.....	.....	55,583	319,955
TOTALS	$24,087	.....	.....	$367,769	$26,752	.....	.....	$70,316	$488,924

(Compiled by the Bureau of Foreign Commerce, Department of Commerce, Washington, D. C.)

UNITED KINGDOM RUBBER STATISTICS

IMPORTS

	July 1919 Pounds	July 1919 Value	July 1920 Pounds	July 1920 Value
UNMANUFACTURED—				
Crude rubber:				
From—				
Straits Settlements	3,864,900	£375,381	6,931,800	£703,209
Federated Malay States	4,660,100	434,701	5,755,900	575,896
British India	161,800	15,550	638,100	65,460
Ceylon and dependencies	1,749,900	167,026	3,561,900	360,262
Other Dutch possessions in Indian seas	952,900	91,203	427,000	42,340
Dutch East Indies (except other Dutch possessions in Indian seas)	2,003,900	201,287	885,800	88,134
Other countries in the East Indies and Pacific not elsewhere specified	175,500	16,528	324,200	32,739
Brazil	291,900	36,336	2,395,100	237,159
Peru	137,300	14,800	6,600	576
South and Central America (except Brazil and Peru)	137,600	13,595	105,200	9,976
West Africa:				
French West Africa	.....	.....	800	63
Gold Coast	32,600	3,048	42,500	4,336
Other parts of West Africa	31,800	2,582	28,100	1,464
East Africa (including Madagascar)	65,300	6,312	142,800	10,237
Other countries	226,200	21,668	204,600	21,775
Totals	14,491,700	£1,400,017	21,450,400	£2,143,626
Waste and reclaimed rubber	611,200	16,480	710,400	12,069
Totals, unmanufactured	15,102,900	£1,416,498	22,160,800	£2,155,695
Gutta percha and balata	233,900	34,692	860,900	139,604
Rubber substitutes	.....	.....	158,100	7,407
MANUFACTURED—				
Boots and shoes...*dozen pairs*	9,412	£17,221	25,574	£68,381
Waterproof clothing	.....	650	.....	512
Tires and tubes	.....	132,622	.....	578,397
Other rubber manufactures	.....	42,447	.....	48,153
Insulated wire	.....	558	.....	300
EXPORTS				
UNMANUFACTURED—				
Waste and reclaimed rubber	1,192,400	£31,650	1,464,500	£41,076
*Rubber substitutes	.....	.....	242,800	11,556
Totals	1,192,400	£31,650	1,707,300	£52,632
MANUFACTURED—				
Boots and shoes...*dozen pairs*	6,565	£14,021	37,375	£71,824
Waterproof clothing	.....	117,824	.....	307,090
Insulated wire	.....	88,452	.....	126,586
Submarine cables	.....	107,265	.....	44,039
Tires and tubes	.....	314,358	.....	763,504
Other rubber manufactures	.....	214,955	.....	465,741
Totals	.....	£856,875	.....	£1,828,784

EXPORTS—COLONIAL AND FOREIGN

	July 1919 Pounds	July 1919 Value	July 1920 Pounds	July 1920 Value
UNMANUFACTURED—				
Crude rubber:				
To Russia	22,400	£3,500	.....	.....
Sweden, Norway and Denmark	571,300	71,017	220,900	£22,846
Germany	108,500	10,064	771,000	64,427
Belgium	772,600	61,244	378,800	48,952
France	763,700	71,576	2,680,100	266,207
Spain	45,100	5,000	53,600	5,728
Italy	408,200	35,412	402,000	42,262
Austria-Hungary	.....	.....	88,300	8,663
Other European countries	495,800	46,369	45,000	4,607
United States	1,046,200	78,449	2,454,900	276,884
Canada	528,100	49,308	219,700	20,587
Other countries	117,900	14,323	416,400	49,167
Totals, rubber	4,869,800	£446,262	7,730,700	£810,332
Waste and reclaimed rubber	.....	.....	1,900	£109
Gutta percha and balata	190,600	£24,868	174,700	19,671
*Rubber substitutes	.....	.....	2,400	101
MANUFACTURED—				
Boots and shoes...*dozen pairs*	15	£168	486	£6,599
Waterproofed clothing	.....	81	.....	9
Tires and tubes	.....	9,264	.....	107,464
Insulated wire	.....	.....	.....	42
Other manufactures	.....	4,766	.....	2,810
Totals, manufactured	.....	£14,279	.....	£116,924

*Included in "Other Articles," Class III, T., prior to 1920.

THE MARKET FOR COTTON AND OTHER FABRICS

NEW YORK

WITH MINOR FLUCTUATIONS, American cotton steadily declined last month, due to the general lack of demand and uncertain crop conditions. From 30.75 cents, the price quoted on August 31, middling uplands spot cotton fell to 25.50 cents on September 30, in a weak market.

At this writing, a fine prospect for cotton is clouded and made uncertain, both in Texas and Oklahoma, by too much precipitation

and consequent damage by boll weevil. This same condition prevails all across the southern portion of the cotton belt to the Atlantic ocean. The amount of the final cotton yield depends much upon the weather in the next three weeks. Only out in Arizona and California is there no question of a yield considerably larger than last year. Incidentally, New Mexico is getting into cotton raising by irrigation. Yet when all the sum of possible disaster by too much rain and by early frost has been summed up there seems the strong likelihood of a crop which will be equal to all our needs with a liberal amount left for export.

During the last week of September all the long staple cotton markets appeared to be weak and price declines were recorded in the entire list.

ARIZONA COTTON. The new crop has not yet appeared in sufficient volume to indicate the actual market. Average extra was said to be around 65 to 70 cents. The only cotton ginned so far is that from volunteer plants and is, therefore, somewhat shorter than the regular cotton.

EGYPTIAN COTTON has declined steadily since mid-summer and now good grade uppers can be bought for 45 cents. Sakel is offered at 75 cents for forward shipment. Crop prospects in Egypt continue favorable, although the outlook is not quite so bright as throughout the season and early receipts are not showing up well as regards staple. Fear is also being expressed by both American and English spinners that the mixing of seed is causing the growths to deteriorate. Representations are being made to the proper authorities to seriously take up the matter of seed distribution and place it under the control of responsible parties.

SEA ISLANDS appear to be firmly held, as $1 is still being asked for average extra choice. The present crop will, without doubt, be less than 5,000 bales all told. Reports from Savannah indicate that the boll weevil has not wrought such havoc this year as last, and that the few farmers who had the courage to plant Sea Islands seem to have carried their crops through the worst attacks. There is, therefore, talk of considerably increasing the acreage next season.

DUCKS, DRILLS AND OSNABURGS. Other than a small demand for hose and belting duck from mechanical goods manufacturers, this market is practically dead as far as the rubber trade is concerned. Prices have materially declined since last month and the quotations here given are all nominal.

RAINCOAT FABRICS. The gray goods market has apparently reached the low level and buyers are once more showing interest in the new fabrics. The actual demand, however, is far from normal. The only fabric that is being sold in volume is 64 by 60 olive drab sheeting, commonly known as bombazine.

TIRE FABRICS. This market is for all practical purposes unquotable and not represented by the sales of small distressed lots that do not indicate actual value based on today's cotton cost.

The fabric mills are curtailing and shutting down, resulting in disorganization that will require several months for a return to efficient production when the normal demand for tire fabrics is resumed. This will probably not materialize until January 1, or early Spring, due to the heavy stocks being carried by tire manufacturers.

NEW YORK QUOTATIONS

SEPTEMBER 27, 1920

Prices subject to change without notice

ASBESTOS CLOTH:			
Brake lining, 2½ lbs. sq. yd., brass or copper insertion ..... *lb.*	*$1.00	@	1.10
2¼ lbs. sq. yd., brass or copper insertion ..... *lb.*	*1.10	@	1.15
BURLAPS:			
32—7-ounce ..... 100 *yards*	7.25	@	
32—8-ounce		@	
40—7½-ounce	8.25	@	
40—8-ounce	8.50	@	
40—10-ounce	10.50	@	
40—10½-ounce	11.00	@	
45—7½-ounce	10.00	@	
45—8-ounce	10.25	@	
48—10-ounce	15.00	@	
DRILLS:			
38-inch 2.00-yard ..... *yard*	.40	@	
40-inch 2.47-yard	.35	@	
52-inch 1.90-yard	.44¼	@	
52-inch 1.95-yard	.43¾	@	
60-inch 1.52-yard	.56	@	
DUCK:			
CARRIAGE CLOTH:			
38-inch 2.00 yard enameling duck ..... *yard*	.42½	@	
48-inch 1.74-yard	.48¾	@	
72-inch 16.66-ounce	.99	@	
72-inch 17.21-ounce	1.03	@	
MECHANICAL:			
Hose ..... *pound*	.70	@	
Belting	.68	@	
HOLLANDS, 40-INCH:			
Acme ..... *yard*		@	
Endurance		@	
Penn		@	
OSNABURGS:			
40-inch 2.35-yard ..... *yard*		@	
40-inch 2.48-yard		@	
37½-inch 2.42-yard		@	
RAINCOAT FABRICS:			
COTTON:			
Bombazine 64 x 60 ..... *yard*	.20	@	
60 x 48	.18	@	
Cashmeres, cotton and wool, 36-inch, tan	.95	@	
Twills 64 x 72	*.46	@	
64 x 102	*.48	@	
Twill, mercerized, 36-inch, blue and black	.42½	@	
tan and olive	.40	@	
Tweed	*.80	@	1.40
printed	*.27½	@	
Plaids 60 x 48	.19	@	
56 x 44	.18	@	
Repp	*.40	@	.45
Prints 60 x 48	.20	@	
64 x 60	.22	@	
IMPORTED WOOLEN FABRICS SPECIALLY PREPARED FOR RUBBERIZING—PLAIN AND FANCIES:			
63-inch, 3½ to 7½ ounces ..... *yard*	.90	@	2.25
36-inch, 2¾ to 5 ounces	.70	@	1.84
IMPORTED PLAID LINING (UNION AND COTTON):			
63-inch, 2 to 4 ounces ..... *yard*	.78	@	1.64
36-inch, 2 to 4 ounces	.49	@	.94
DOMESTIC WORSTED FABRICS:			
36-inch, 4½ to 8 ounces ..... *yard*	.70	@	1.54
DOMESTIC WOVEN AND PLAID LININGS (COTTON):			
36-inch, 3¾ to 5 ounces	.22	@	.28

UNITED STATES CRUDE RUBBER IMPORTS FOR 1920 (BY MONTHS)

1920	Plantations	Parás	Africans	Centrals	Guayule	Manicoba and Matto Grosso	Balata	Miscellaneous Gum	Waste	Totals 1920	Totals 1919
January .....tons	17,799	2,620	821	111	....	....	....	....	....	21,351	7,235
February	29,681	2,456	558	265	34	....	....	....	....	32,994	17,456
March	28,533	2,463	514	23	114	3	113	983	1,252	33,998	28,223
April	21,036	1,893	628	29	79	10	22	812	448	24,957	28,146
May	24,443	2,025	662	93	113	....	45	1,059	224	28,666	16,348
June	12,911	1,352	427	27	164	....	7	552	164	15,604	16,319
July	14,695	1,115	34	40	....	....	8	1,283	312	17,487	17,965
August	12,730	590	13	75	136	....	67	1,135	300	15,066	11,067
Totals, 8 months, 1920.	161,828	14,514	3,657	663	660	13	262	5,824	2,700	190,123	....
Totals, 8 months, 1919.	121,710	16,637	1,724	1,085	1,442	161	....	....	....	....	142,759

(Compiled by The Rubber Association of America, Inc.)

SHEETINGS, 40-INCH:			
48 x 48, 2.25-yard	yard	.24½	@
48 x 48, 2.50-yard		.23	@
48 x 48, 2.85-yard		.19	@
64 x 68, 3.15-yard		.26	@
56 x 60, 3.60-yard		.19	@
48 x 44, 3.75-yard		.17¼	@
SILKS:			
Canton, 38-inch	yard	.50	@
Schappe, 36-inch		.70	@
STOCKINETTES:			
SINGLE THREAD:			
3½ Peeler, carded	pound		@
4½ Peeler, carded			@
6½ Peeler, combed			@
DOUBLE THREAD:			
Zero Peeler, carded	pound		@
3½ Peeler, carded			@
6½ Peeler, combed			@
TIRE FABRICS:			
BUILDING:			
17¼-ounce Sakellarides, combed	pound	*2.35	@
17¼-ounce Egyptian, combed		*2.15	@
17¼-ounce Egyptian, carded		*2.05	@
17¼-ounce Peelers, combed		*2.25	@
17¼-ounce Peelers, carded		*1.47	@
CORD:			
15-ounce Egyptian	pound	*2.40	@
BICYCLE:			
8-ounce American	pound	*1.50	@
10-ounce American		*1.48	@
CHAFER:			
9¼-ounces Sea Island	pound		@
9¼-ounce Egyptian, carded		*2.29	@
9¼-ounce Peeler, carded		*1.71	@

*Nominal.

EGYPTIAN COTTON EXPORTS

The exports of cotton for the periods September 1, 1918, to June 28, 1919, and September 1, 1919, to June 26, 1920, as shown in the monthly agricultural statistics (June 30, 1920), published by the Statistical Department of the Ministry of Finance of Egypt, are as follows:

Destination	Sept. 1, 1918, to June 28, 1919		Sept. 1, 1919, to June 26, 1920	
	Bales*	Cantars†	Bales*	Cantars†
America	54,248	395,894	272,850	2,038,783
Austria	.....	.....	1,426	10,318
Belgium	.....	.....	2,368	17,329
France	44,964	331,222	49,970	384,437
Germany	.....	.....	6,235	45,293
Greece	2,550	18,332	551	3,580
Italy	24,121	176,466	37,669	281,256
Japan	10,909	78,647	16,368	121,453
Netherlands	.....	.....	2,209	15,771
Portugal	250	1,786	800	5,512
Rumania	.....	.....	55	405
Spain	7,456	54,907	9,593	71,500
Switzerland	19,761	146,542	11,739	88,161
Turkey	.....	.....	185	769
United Kingdom	300,577	2,209,004	401,387	3,029,344
Other countries	.....	.....	417	3,085
Total	464,836	3,412,800	813,822	6,116,996

*1 bale of steam-pressed cotton weighs approximately 7.75 cantars; and 1 bale of cotton pressed hydraulically, 8.50 cantars.
† The cantar is equivalent to 99.0493 pounds avoirdupois.
(Compiled in the Near East Division, Bureau of Foreign and Domestic Commerce.)

THE MARKET FOR CHEMICALS AND COMPOUNDING INGREDIENTS

NEW YORK

THE DEMAND of the rubber trade for such items as zinc oxide, lithopone and carbon black has been much less than usual during the past month, owing to the general curtailment in the manufacture of automobile tires, in the making of which these items are largely used. As they are also important ingredients in the manufacture of paint, prices are well maintained by the steady demand from that industry.

ANILINE. Trade demand has been only moderate in volume and spot stock prices have ranged from 27½ to 30 cents per pound.

BARYTES. The scarcity of crude barytes will continue to hamper the production of refined product for months to come until increased supplies and enlarged facilties can be developed.

BLANC FIXE. This important product from barytes is in much demand and its supply is only limited by the resources of crude available.

BENZOL. The demand continues in excess of the supply. Spot stocks of the pure grade are steady at 35 cents per pound.

BLACKS. While blacks are in good demand by the paint trade, there is a marked falling off in the rubber trade requirements which will not again reach normal proportions until automobile tire manufacturers are able to resume capacity production. The present output is averaging approximately one-third of manufacturing capacity only.

CHINA CLAY. Receipts from abroad are liberal but as they have been bought to arrive they do not particularly affect the market, which holds steady in demand.

CARBON BISULPHIDE. The demand holds steady at slight advance in price.

CARBON TETRACHLORIDE. In sympathy with carbon bisulphide, from which it is manufactured, carbon tetrachloride holds steady in price and demand.

DRY COLORS. Market conditions register little change and none in anticipation.

LITHARGE. This material is in steady demand and follows the same market influences as all other lead products. Production is not far in excess of demand.

LITHOPONE. The supply falls considerably short of the demand due to the shortage of crude barytes necessary in its manufacture. Some of the makers of lithopone have advanced prices for the last quarter of 1920 one-half cent per pound during September. To meet the demands of the paint trade a new grade of lithopone known as albalith has been placed on the market. This material has special light resistant properties.

Sublimed Lead. Continues in good demand, much the same as litharge, with which it compares as a standard rubber trade pigment.

Sulphur. The market holds very steady in demand and price.

Solvent Naphtha. Supplies are scarce and firm in price with demand steady for all grades.

Whiting. Improved supplies of chalk have helped the whiting trade and relieved the situation for rubber manufacturers who prefer the native chalk whiting to the manufactured substitutes.

Zinc Oxide. The effect of the reduction of tire production has been noted in the demand for zinc oxide although it has not embarrassed the production of this material, for which there is a good demand from the paint industry, which holds the price steady.

NEW YORK QUOTATIONS

September 27, 1920

Prices subject to change without notice

ACCELERATORS, ORGANIC				
Accelerene (New York)	lb.	$4.75	@	
Accelemal	lb.	.60	@	.65
Aldehyde ammonia crystals	lb.	*2.70	@	3.25
Aniline oil	lb.	.28½	@	
Excellerex	lb.	.65	@	.75
Hexamethylene tetramine (powdered)	lb.	2.25	@	2.50
N. C. C.	lb.	.50	@	
No. 999	lb.	.21	@	
Paraphenylenediamine	lb.	2.60	@	2.70
Thiocarbanilide	lb.	.57	@	.70
Velosan	lb.	3.70	@	
Vul-Ko-Cene	lb.	.35	@	
Virol	lb.	.80	@	
ACCELERATORS, INORGANIC				
Lead, dry red (bbls.)	lb.	.12¼	@	
sublimed blue (bbls.)	lb.	.10	@	.10¼
sublimed white (bbls.)	lb.	.10	@	
white, basic carbonate (bbls.)	lb.	.10½	@	
Lime, flour	lb.	.01¾	@	.03
Litharge, domestic	lb.	.11¾	@	*.15
imported	lb.		@	
sublimed	lb.	.12	@	
Magnesium, carbonate, light	lb.	11½	@	.12½
calcined extra light	lb.	.60	@	.65
calcined light	lb.	.30	@	
calcined medium light	lb.	.25	@	
calcined heavy	lb.	.07½	@	.08
calcined commercial (magnesite)	lb.	.04	@	
oxide, extra light	lb.	.55	@	.70
light technical	lb.	.35	@	
light, imported	lb.	.55	@	
imported	lb.	.55	@	
ACIDS				
Acetic, 28 per cent (bbls.)	cwt.	3.75	@	4.50
glacial, 99 per cent (carboys)	cwt.	15.95	@	16.70
Cresylic (97% straw color) (bbl.)	gal.	1.30	@	
(95% dark) (bbl.)	gal.	1.10	@	1.20
Muriatic, 20 degrees	cwt.	2.25	@	2.50
Nitric, 36 degrees	cwt.	6.25	@	6.50
Sulphuric, 66 degrees	ton	20.00	@	
ALKALIES				
Caustic soda, 76 per cent (bbls.)	lb.	.04½	@	.07½
Soda ash (bbls.)	lb.	.05	@	
COLORS				
Black:				
Bone, powdered	lb.	.06	@	.07½
granulated	lb.	.11	@	.15
Carbon black (sacks, factory)	lb.	.15	@	.25
pressed	lb.	.20	@	.26
Drop	lb.	.08½	@	.20
Ivory black	lb.	.18	@	.30
Lampblack	lb.	.18	@	.45
Oil soluble aniline	lb.	1.00	@	
Rubber black	lb.	.08½	@	
Blue:				
Cobalt	lb.	.25	@	.35
Prussian	lb.	.75	@	1.00
Ultramarine	lb.	.18	@	.40
Rubber makers' blue	lb.	3.50	@	
Brown:				
Iron oxide	lb.	.04¼	@	.06¾
Sienna, Italian, raw and burnt	lb.	.06½	@	.15
Umber, Turkey, raw and burnt	lb.	.05½	@	.09
Vandyke	lb.	.08	@	.10
Maroon oxide	lb.	.14	@	.15
Green:				
Chrome, light	lb.	.42	@	.70
medium	lb.	.42	@	.70
dark	lb.	.50	@	.70
commercial	lb.	.07	@	.15
tile	lb.	.08	@	.20
Oxide I. R.	lb.	.85	@	1.05
Oxide of chromium (casks)	lb.	1.25	@	
Rubber makers' green	lb.	3.50	@	
Red:				
Antimony, crimson, sulphuret of (casks)	lb.	$0.45	@	
crimson, "Mephisto" (casks)	lb.	.60	@	
crimson, "R. M. P."	lb.	.65	@	
Antimony, golden sulphuret of (casks)	lb.	.20	@	.22
golden sulphuret (States)	lb.	.35	@	.40
golden, "Mephisto" (casks)	lb.	.33	@	
golden, "R. M. P."	lb.	.33	@	
red sulphuret (States)	lb.	.25	@	.30
vermilion sulphuret	lb.	.55	@	
Arsenic, red sulphide	lb.	.17½	@	
Indian	lb.	.14	@	.15
Para toner	lb.	2.25	@	
Red excelsior	lb.	.19	@	.22
Toluidine toner	lb.	4.25	@	
Iron oxide, reduced grades	lb.	.08	@	.12
pure bright	lb.	.12	@	.18
Maroon oxide	lb.	.14	@	.15
Spanish neutral	lb.	.05¼	@	
Venetian	lb.	.03	@	.07
Oil soluble aniline, red	lb.	1.75	@	2.00
orange	lb.	1.65	@	
Oximony	lb.	.18	@	
Vermilion, American	lb.	.25	@	.30
permanent	lb.	.37	@	
English quicksilver	lb.	1.70	@	1.75
Rubber makers' red	lb.	3.50	@	
purple	lb.	3.50	@	
White:				
Albalith	lb.	.07¾	@	.08¼
Aluminum bronze, extra brilliant	lb.	.65	@	
extra fine	lb.	.75	@	
Lithopone, domestic	lb.	.07¾	@	.09½
Ponolith (carloads, factory)	lb.		@	
Rubber-makers' white	lb.		@	

Zinc oxide. American (factory):		C. L.		L. C. L.
Special	lb.	.10½	@	.11
XX red	lb.	.10½	@	.11
French process (factory):				
White seal	lb.	.13½	@	.17
Green seal	lb.	.12¼	@	.12¾
Red seal	lb.	.11¼	@	.13½
Azo factory:				
ZZZ (lead free)	lb.		@	
ZZ (under 5% leaded)	lb.		@	
Z (8-10% leaded)	lb.		@	

Yellow:				
Cadmium, sulphide, yellow, light, orange	lb.	2.10	@	
red	lb.	2.10	@	
Chrome, light and medium	lb.	.35	@	.38
Ochre, domestic	lb.	.02½	@	.05½
imported	lb.	.04¾	@	.08
Oil, soluble aniline	lb.	1.75	@	
Rubber makers' yellow	lb.	2.50	@	3.50
Zinc chromate	lb.	.50	@	.55
COMPOUNDING INGREDIENTS				
Aluminum flake (carload)	ton	33.00	@	
silicate	ton	30.00	@	40.00
Ammonium carbonate (powdered)	lb.	.17¾	@	
Asbestine (carloads)	ton	30.00	@	40.00
Barium, carbonate, precipitated	ton	100.00	@	120.00
sulphide, precipitated	lb.	.05	@	
dust	ton	120.00	@	
Barytes, pure white (f. o. b. works)	ton	28.00	@	
off color	ton	20.00	@	
uniform floated	ton	28.00	@	
Basofor	lb.	.06½	@	
Blanc fixe (dry, bbls.)	lb.	.06	@	.06¼
Bone ash	lb.	.12	@	
Carrara filler	lb.	.02	@	
Chalk, precipitated, extra light	lb.	.05	@	.05½
heavy	lb.	.04	@	.04½
China clay, Dixie	ton	22.00	@	
Blue Ridge	ton	22.00	@	
domestic	ton	10.00	@	20.00
imported	ton	19.00	@	25.00
Cotton linters, clean mill run, f. o. b. factory	lb.	.03½	@	
Fossil flour (powdered)	ton	60.00	@	
(bolted)	ton	65.00	@	
Diatomite	lb.	.03	@	.04
Glue, high grade	lb.	.35	@	.45
medium	lb.	.30	@	.35
low grade	lb.	.20	@	.25
Graphite, flake (400-pound bbl.)	lb.	.10	@	.25
amorphous	lb.	.04	@	.08
Ground glass FF. (bbls.)	lb.	.03	@	
Infusorial earth (powdered)	ton	60.00	@	
(bolted)	ton	65.00	@	
Liquid rubber	lb.	.18	@	
Mica, powdered	lb.	.15	@	
Pumice stone, powdered (bbl.)	lb.	.05	@	.10
Rotten stone, powdered	lb.	.02½	@	.04½
Rubber paste	lb.	.19	@	.22
Silica, gold bond	ton	40.00	@	
silver bond	ton	28.00	@	
Soapstone, powdered gray (carload)	ton	12.00	@	
Starch, powdered corn	cwt.	4.73	@	
Talc, powdered soapstone	ton	20.00	@	25.00
Terra blanche	ton	22.00	@	32.00
Tripoli earth, air-floated, cream or rose (factory)	ton	50.00	@	
white (factory)	ton	52.50	@	
Tyre-lith	ton	120.00	@	130.00
Whiting, Alba (carloads)	cwt.	.80	@	.90
Columbia	cwt.	.95	@	
commercial	cwt.	1.50	@	
Danish	ton	24.00	@	
English cliffstone	cwt.	2.00	@	
gilders	cwt.	1.60	@	
Paris, white, American	cwt.	1.75	@	
Quaker	ton	16.00	@	
Super	ton	30.00	@	32.50

Wood pulp, imported	lb.	$0.03¼	@	
XXX	ton	65.00	@	
X	ton	60.00	@	
Wood flour, American	ton	*50.00	@	
MINERAL RUBBER				
Elateron (c. l. factory)	ton	60.00	@	
(l. c. l. factory)	ton	63.00	@	
Gilsonite	ton	75.00	@	
Genasco (c. l. factory)	ton	69.00	@	
(l. c. l. factory)	ton	71.00	@	
Hard hydrocarbon	ton	42.00	@	
Soft hydrocarbon	ton	40.00	@	
K-X	ton		@	
K. M. R.	ton		@	
M. R. X.	ton		@	
Pioneer (c. l. factory)	ton	60.00	@	
(l. c. l. factory)	ton	65.00	@	
Raven M. R.	ton	60.00	@	65.00
Refined Elaterite	ton		@	
Richmond	ton		@	
No. 64	ton		@	
318/320 M. P. hydrocarbon (c. l. factory)	ton	50.00	@	
(l. c. l. factory)	ton	53.00	@	70.00
300/310 M. P. hydrocarbon (c. l. factory)	ton	47.50	@	
(l. c. l. factory)	ton	50.00	@	
Robertson, M. R. pulverized (c. l. factory)	ton	95.00	@	
M. R. pulverized (l. c. l. factory)	ton	97.50	@	
M. R. (c. l. factory)	ton	72.50	@	
M. R. (l. c. l. factory)	ton	75.00	@	
Rubrax (factory)	ton	50.00	@	
Synpro, granulated	ton	97.50	@	
Walpole rubber flux (factory)	lb.	.05	@	
OILS				
Avoilas compound	lb.	.17	@	.19
Castor, No. 1, U. S. P.	lb.	.18	@	
No. 3, U. S. P.	lb.	.17	@	
Corn	lb.	.16	@	
Corn, refined Argo	cwt.	17.25	@	
Cotton	lb.	.15	@	
Glycerine (98 per cent)	lb.	.28	@	.29
Linseed, raw (carloads)	gal.	1.20	@	
Linseed compound	gal.		@	
Palmoline	lb.	.15	@	.17
Palm niger	lb.	.11½	@	
Palm "Lagos"	lb.	.14	@	
Palm special	lb.	.17	@	
Peanut	lb.	.18	@	
Petrolatum	lb.	.10	@	.12
Petrolatum, sticky	lb.	.12	@	.14
Petroleum grease	lb.	.07½	@	.09
Pine, steam distilled	gal.	1.85	@	2.00
Rapeseed, refined	lb.	.20	@	
blown	lb.	.20	@	
Rosin	gal.	.70	@	.95
Synpro	gal.	.70	@	1.00
Soya bean	lb.	.14	@	
Tar	gal.	.36	@	.42
RESINS AND PITCHES				
Balsam, fir	gal.	2.00	@	
Cantella gum	lb.	.50	@	
Cumar resin, hard	lb.	.16	@	
soft	lb.	.13	@	
Tar, retort	bbl.	15.00	@	15.50
kiln	bbl.	14.50	@	15.00
Pitch, Burgundy	lb.	.08½	@	
coal tar	lb.	.02	@	
pine tar	lb.	.04	@	
ponto	lb.	.14	@	
Rosin, K	bbl.	13.75	@	
strained	bbl.		@	
Shellac, fine orange	lb.	1.30	@	1.50
SOLVENTS				
Acetone (98.99 per cent drums)	lb.	.25	@	
methyl (drums)	gal.	1.50	@	
Benzol (water white, 90%)	gal.	.33	@	.38½
Beta-naphthol	lb.	.80	@	
Carbon bisulphide (drums)	lb.	.07½	@	.08¾
tetrachloride (drums)	lb.	.13	@	.15
Naphtha, motor gasoline (steel bbls.)	gal.	.31	@	
73 @ 76 degrees (steel bbls.)	gal.	.41	@	
70@ 72 (steel bbls.)	gal.	.39	@	
68 @ 70 degrees (steel bbls.)	gal.	.38	@	
V. M. & P. (steel bbls.)	gal.	.30	@	
Toluol, pure	gal.	.35	@	.40½
Turpentine, spirits	gal.	1.46	@	
wood	gal.	1.40	@	1.43
Osmaco reducer	gal.	.65	@	
Xylol, pure	gal.	.45	@	.50½
commercial	gal.	.30	@	.35½
SUBSTITUTES				
Black	lb.	.10	@	.20
White	lb.	.11	@	.23
Brown	lb.	.15	@	.21
Brown factice	lb.	.10	@	.21
White factice	lb.	.11	@	.24
Paragol, soft and medium (carloads)	cwt.	18.81	@	
hard	cwt.	18.31	@	
VULCANIZING INGREDIENTS				
Lead, black hyposulphite (Black Hypo)	lb.	.32	@	.39
Orange mineral, domestic	lb.	.15¼	@	
Sulphur chloride (jugs)	lb.	.20	@	
(drums)	lb.	.08	@	
Sulphur, flour, Brooklyn brand (carloads)	cwt.	3.40	@	
Bergenport, soft (c. l. factory)	cwt.	3.85	@	
Bergenport, soft (l. c. l. factory)	cwt.	4.15	@	
superfine (carloads, factory)	cwt.	2.00	@	2.62

(See also Colors—Antimony.)

WAXES				
Wax, beeswax, white	lb.	$0.67	@	
ceresin, white	lb.	.16	@	
carnauba	lb.	.35	@	
ozokerite, black	lb.	.65	@	
green	lb.	.65	@	
Montan	lb.	.20	@	
paraffine, refined 118/120 m. p. (cases)	lb.		@	
123/125 m. p. (cases)	lb.		@	
128/130 m. p. (cases)	lb.		@	
Sweet wax	lb.	.15	@	

THE MARKET FOR RUBBER SCRAP

NEW YORK

THE PREVAILING INACTIVITY noted in the reclaimed rubber market has brought the rubber scrap business well nigh to a full stop. Reclaimers are well stocked with the various grades of scrap, and, according to the present outlook, will not be in the market in force for months to come, owing to the general demand of their customers for deferred shipment of goods on order. Such interest as exists is confined to the better grades of scrap, such as boots and shoes, inner tubes and tires.

QUOTATIONS FOR CARLOAD LOTS DELIVERED

Prices subject to change without notice

SEPTEMBER 27, 1920

BOOTS AND SHOES:				
Arctic tops	lb.	*$0.075	@	
Boots and shoes	lb.	*.06½	@	.06¾
Trimmed arctics	lb.	*.05¼	@	.05¾
Untrimmed arctics	lb.	*.04¼	@	.04¾
HARD RUBBER:				
Battery jars, black compound	lb.	*.01	@	.01¼
No. 1, bright fracture	lb.	*.23	@	.24
INNER TUBES:				
No. 1	lb.	*.14½	@	.15
Compounded	lb.	*.08½	@	.09
Red	lb.	*.07	@	.07½
MECHANICALS:				
Black scrap, mixed, No. 1	lb.	*.03½	@	.04
No. 2	lb.	*.02½	@	.02¾
Car springs	lb.	*.03½	@	.04
Heels	lb.	*.03	@	.03½
Horse-shoe pads	lb.	*.03	@	.03½
Hose, air brake	lb.	*.03½	@	.03¾
fire, cotton lined	lb.	*.01½	@	.01¾
garden	lb.	*.01½	@	.01¾
Insulated wire stripping, free from fiber	lb.	*.03½	@	.04
Matting	lb.	*.01¼	@	.01½
Red packing	lb.	*.05½	@	.06
Red scrap, No. 1	lb.	*.09	@	.10
No. 2	lb.	*.06¾	@	.07¼
White scrap No. 2	lb.	*.08	@	.09
No. 1	lb.	*.10	@	.11
TIRES:				
PNEUMATIC—				
Auto peelings	lb.	*.03¾	@	.04¼
Bicycle	lb.	*.02¼	@	.02¾
Standard white auto	lb.	*.03¾	@	.04¼
Mixed auto	lb.	*.02½	@	.03
Stripped, unguaranteed	lb.	*.01¾	@	.02¼
White, G. & G., M. & W., and U. S.	lb.	*.04¼	@	.04¾
SOLID—				
Carriage	lb.	*.04	@	.04¼
Irony	lb.	*.01	@	
Truck	lb.	*.03½	@	.03¾

*Nominal.

NOTES ON ACCELERATORS

In the article under the above caption by Dr. Henry P. Stevens, published in THE INDIA RUBBER WORLD, August 1, 1920, pages 719-720, the tabulation of figures quoted, although given by Seidl, were not from his own results, but based on experimental results of Gottlob. On this point the article should have referred to the figures as "Some figures of Gottlob recently quoted by Seidl" in order to be strictly in keeping with the facts.

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TABLE OF CONTENTS.